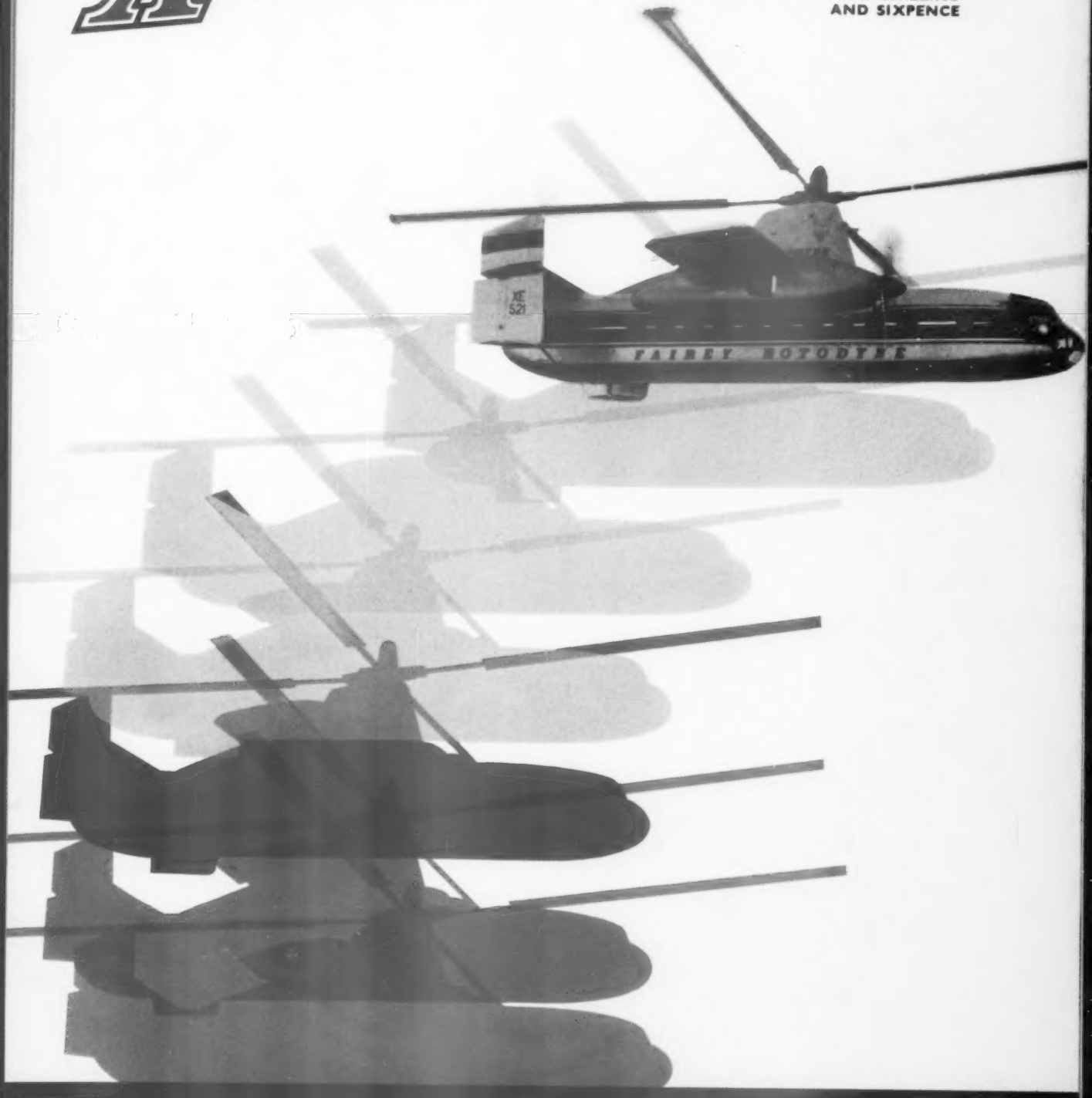
THE AEROPLANE

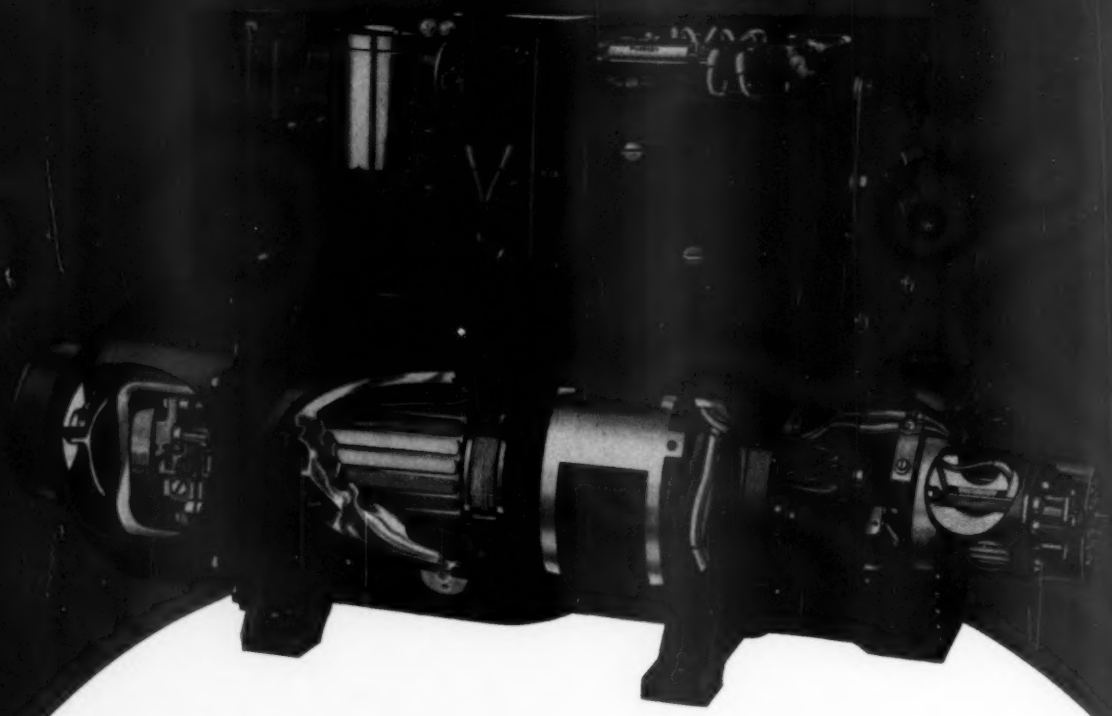
APRIL 3, 1959

EVERY FRIDAY
ONE SHILLING
AND SIXPENCE



FAIREY ROTODYNE

3kVA invertor



This compact new 3 kVA Invertor by Plessey—already ordered to serve aboard the Vanguard—is designed to convert general d.c. supply to three-phase alternating current for aircraft instruments and allied equipment. It has an excellent power/weight ratio, features close frequency control and is self-cooled. The control box is mounted integrally with the Invertor and houses the starting gear, radio suppression components and the voltage regulator. Design Engineers who are interested in this or other Plessey aircraft equipment are invited to request full technical information.

Plessey

AIRCRAFT & ATOMIC ENERGY GROUP · AIRCRAFT ELECTRICAL DIVISION
THE PLESSEY COMPANY LIMITED · ILFORD · ESSEX

The TEST RESULTS that placed Palmer Fluoroflex on the COMET

Palmer Fluoroflex, designed to give at least 5,000 hours service life, saves up to 20% on conventional rubber pipe weight. No limiting "shelf life" in storage.

Fluoroflex (P.T.F.E.) Flexible Pipes are being fitted to the Comet IVB for British European Airways.

Palmer Fluoroflex Flexible Pipes have successfully withstood the following rigorous tests:

TEST 1

(a) Simultaneous Impulse and Vibration.
Pipe sizes −4 ($\frac{7}{32}$″ bore), −6 ($\frac{1}{4}$″ bore) and −8 ($\frac{7}{16}$″ bore).

IMPULSE:	600,000 cycles at 100 cycles/min. to peak pressure of 3,800 p.s.i. Rate of pressure increase 126,500 p.s.i. per sec.
VIBRATION:	Amplitude ± .005″ at 7,500 cpm frequency.
TEMPERATURE:	120°C. internal and ambient.

(b) Continuation of test for 900 hours at static pressure of 3,000 p.s.i. and normal ambient and internal temperature.

TEST 2

(a) Simultaneous Impulse, Vibration and Flexing
Pipe sizes −4 ($\frac{7}{32}$″ bore) and −6 ($\frac{1}{4}$″ bore).
Impulse as in Test 1.

VIBRATION:	Amplitude ± .020″ at 3,000 cpm. frequency.
FLEXING:	4″ for 20,000 cycles and 9″ for 40,000 cycles.
TEMPERATURE:	Normal for 99 hours, −55°C. for 8 hours.

(b) Continuation of test for 900 hours at static pressure of 3,000 p.s.i., normal internal and ambient temperatures and without flexing.

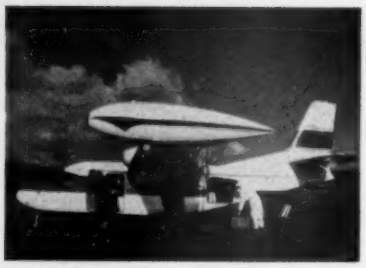
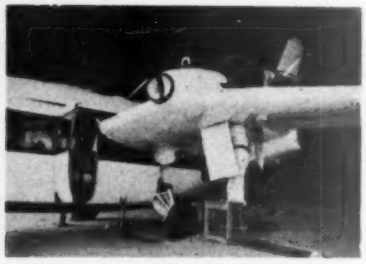
The above tests each correspond to 10,000 hours factored life on the hydraulic system of the De Havilland Comet IVB.

Palmer

Palmer Aero Products Ltd PENFOLD ST. LONDON N.W.8

AERO PRODUCTS DIVISION · BTR INDUSTRIES LIMITED

6/2929
A

A Family of Business Aircraft
PIAGGIO of GENOA

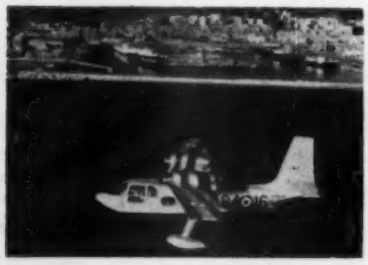
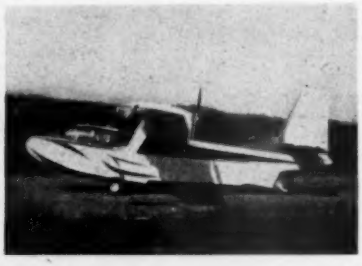
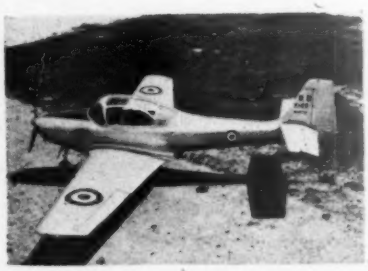
offers

P.166 six/eight seater executive
£28,735

P.136-L five seater amphibian
£20,690 to £25,565

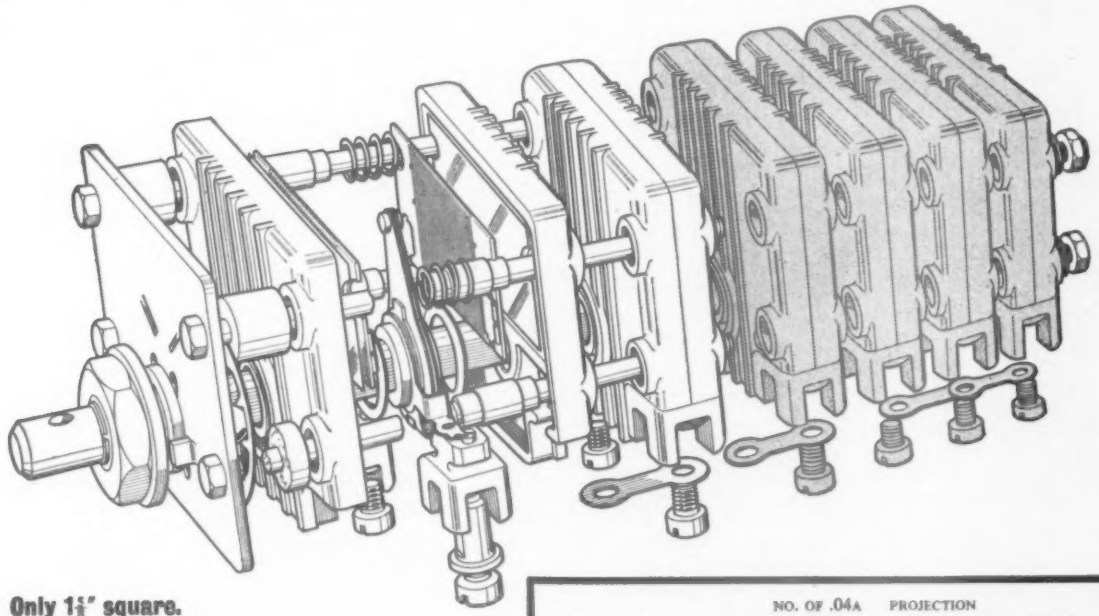
P.149-D five seater aerobatic trainer/tourer
£11,300

These are all Production Models—backed by over 40 years aviation experience and almost a century of engineering.

British Representatives: **AERO-ENTERPRISES (Boreham Wood) Ltd.** **ELS 2688**

a New THORN MINIATURE DIMMER RESISTOR half the weight and 1" smaller than equivalent types



- **Only 1⅛" square.**
- **Standard range control from 2 to 50 Thorn 28 volt, 1 watt, Miniature P. Lamps.**
- **Maximum temperature rise of 30° c. building up to ambient temperature of 70° c.**
- **Positive off position. Flame proof.**

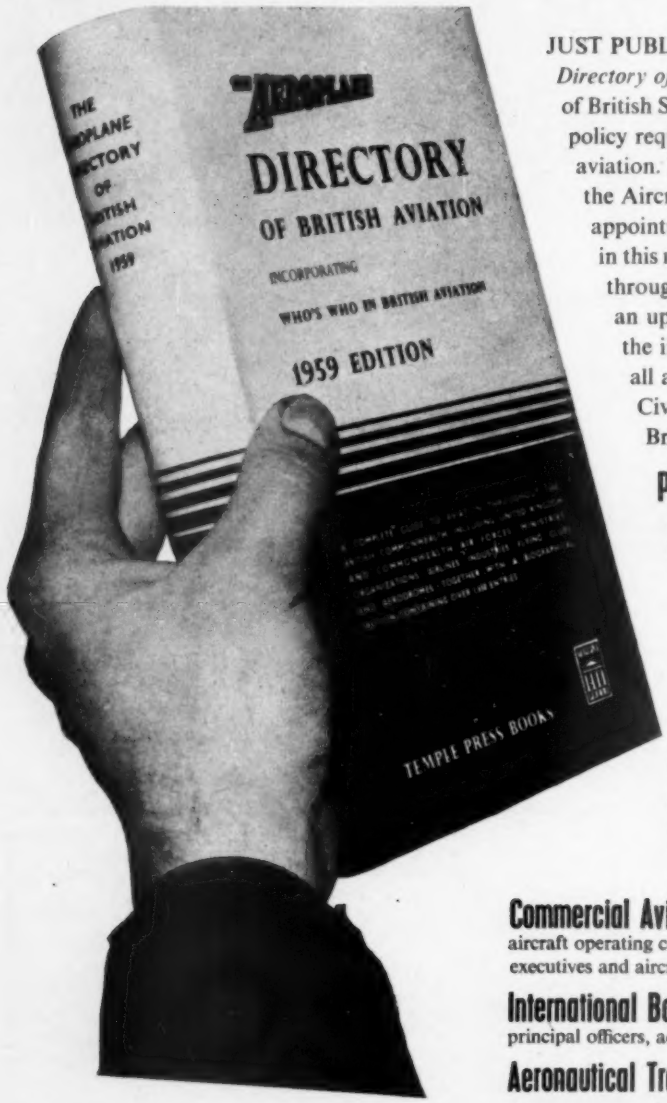
Primarily designed for use with Thorn Plasteck and also Pillar and Bridge lighting systems, this miniature resistor is widely employed in all fields of controlled lighting systems for cockpit and console panels and for telecommunication equipment. Construction allows for wide variation in the assembly of the resistor elements to suit many applications. Standard fixing is by screwed bush and locating peg. The Dimmer is operated by a quarter inch dia. spindle.

RESISTANCE IN OHMS	NO. OF SECTIONS	NO. OF .04A FILAMENTS FOR WHICH ASSY IS SUITABLE	PROJECTION BEHIND MOUNTING PANEL	PART NO.
600	1	2	1.175	80/10/0946
300	1	3 — 5	1.175	80/10/0938
150	1	6 — 10	1.175	80/10/0940
100	1	11 — 16	1.175	80/10/0941
75	2	17 — 23	1.575	80/10/0926
50	2	24 — 31	1.575	80/10/0935
33	3	32 — 50	2.075	80/10/0942
2 × 600	2	2 × 2	1.575	80/10/0949
2 × 300	2	2 × 3 — 5	1.575	80/10/0947
2 × 150	2	2 × 6 — 10	1.575	80/10/0936
2 × 100	2	2 × 11 — 16	1.575	80/10/0937
2 × 75	4	2 × 17 — 23	2.475	80/10/0943
2 × 50	4	2 × 24 — 31	2.475	80/10/0944
2 × 33	6	2 × 32 — 50	3.375	80/10/0945

Enquiries to
Aircraft Components & Connector Division, Thorn Electrical Industries Ltd., Great Cambridge Rd., Enfield, Middx. Tel: Enfield 5353

new names, *new* appointments, *new* companies, *new* groupings . . .
all are listed in the *new* 1959 Edition of

THE AEROPLANE DIRECTORY
OF BRITISH AVIATION



JUST PUBLISHED, the new 1959 Edition of *The Aeroplane Directory of British Aviation* reflects the changing pattern of British Service and Civil Aviation dictated by new Defence policy requirements and altering conditions of commercial aviation. New company alignments, new groupings within the Aircraft Industry and the many important new appointments which follow in their train, are all recorded in this new edition of the Directory which has been revised throughout. Every up-to-date office and library requires an up-to-date copy of "*The Aeroplane*" *Directory*, the indispensable source of reference covering all aspects of aeronautical activity, Service and Civilian, in the United Kingdom and throughout the British Commonwealth.

PRINCIPAL CONTENTS INCLUDE:

Service Aviation: Senior appointments in the Royal Air Force, at the Air Ministry and in the Commonwealth and NATO Air Forces; principal air appointments in the Army and Royal Navy; British and Foreign Air Attaches; Service Air Stations in the U.K.

Civil Ministries: Principal appointments in Civil Ministries and Aviation Authorities at home and overseas.

The Aircraft Industry: Names of directors and chief executives of companies in the British and Commonwealth Industries and a 300-page classified directory covering aircraft, guided missile and engine constructors and allied manufacturers.

Commercial Aviation: Details of all British and Commonwealth aircraft operating companies, nationalized and independent, with lists of senior executives and aircraft fleets. List of U.K. civil aerodromes.

International Bodies, Societies and Clubs: Includes names of principal officers, addresses and a list of over 240 flying and gliding clubs.

Aeronautical Training: Colleges, schools and apprenticeship schemes.

Aeronautical Press: British and Commonwealth periodicals and Air Correspondents.

Biographical Section: Containing over 1,650 entries.

Size 8¾ in. x 5¾ in. Over 600 pages.
Linson Boards.
Price 30s. net *(postage 1s. 9d.)*

TEMPLE PRESS BOOKS: BOWLING GREEN LANE · LONDON E C 1

N-156F DESIGN CONCEPT DELIVERS ECONOMY...MAXIMUM STRIKING POWER

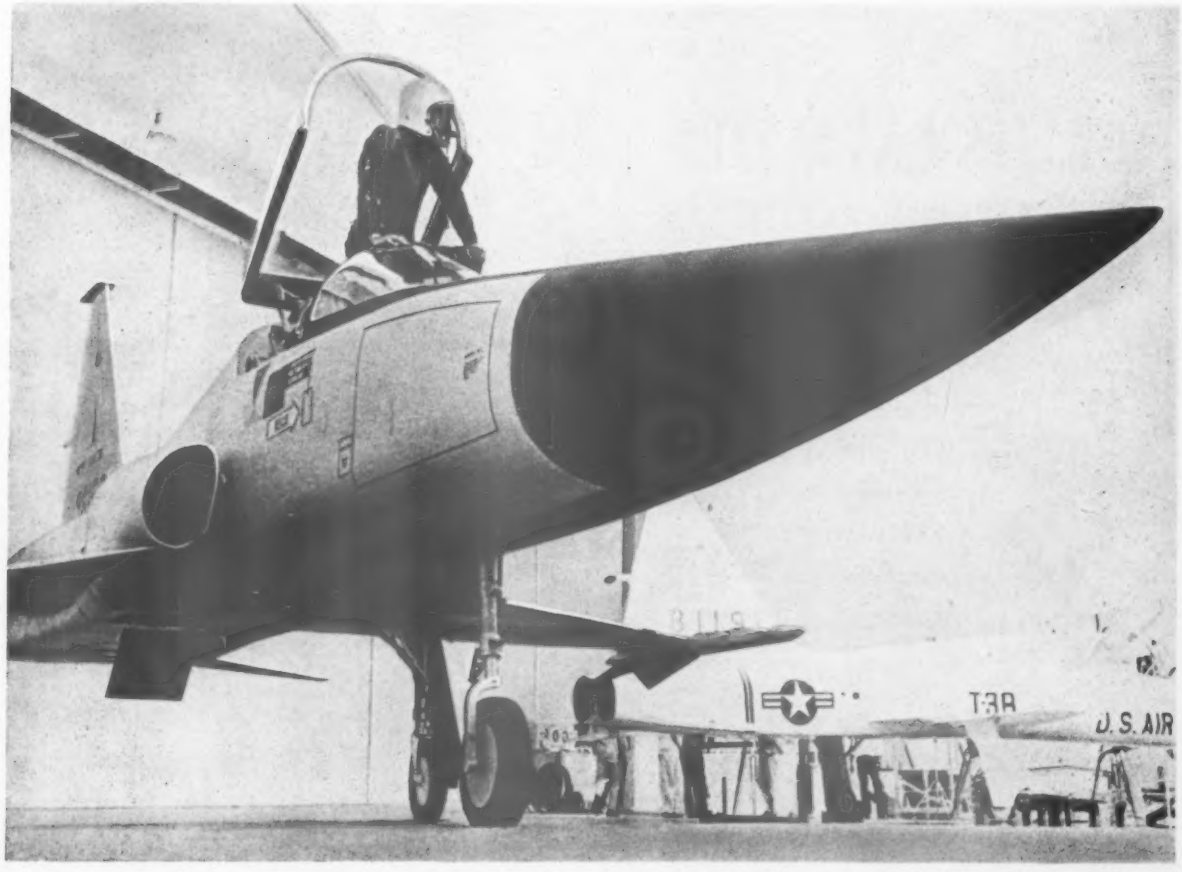
To deliver maximum fighting power within the available defense resources of the free-world nations, Northrop has developed the new, multi-purpose N-156F – the Freedom Fighter. The supersonic N-156F is lightweight, takes advantage of new high-thrust-to-weight jet engines and uses less than half the fuel of comparable U.S. fighters.

In addition, this fighter offers unique logistic and technical advances. The N-156F can operate from short airfields or be adapted for zero-length launch. This mobility contributes to quicker reactions. It permits more aircraft on ready alert along a wider and more dispersed perimeter for maximum striking power–with minimum vulnerability.

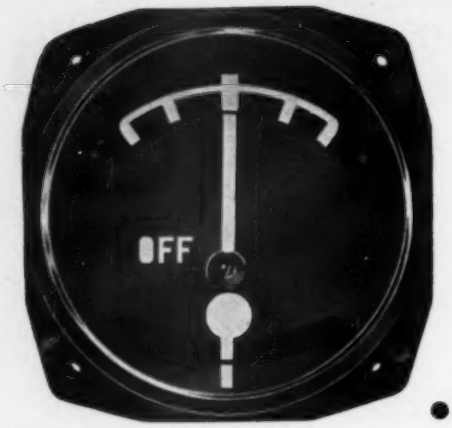
Northrop's N-156F has been selected for development by the U.S. Air Force. It is the first supersonic fighter American-designed for specific tactical and economic requirements of other free-world nations. Designed for production outside the United States, the N-156F will make a substantial contribution to the economies of the areas it is designed to defend. *First Freedom Fighter now being manufactured will be flight-tested this year.*

NORTHROP INTERNATIONAL

BEVERLY HILLS, CALIFORNIA, U.S.A.
A Division of Northrop Corporation



COMET IVB



PULLIN

TURN & SLIP INDICATOR

MK. 2C/PF/WB2

Developed for use in civil airliners
and specified for use in the
Britannia and Comet Aircraft

● *Models also available for Service Aircraft and Gliders*

R. B. PULLIN & CO. LTD · *PHOENIX WORKS · GREAT WEST ROAD · BRENTFORD · MIDDX*

Tel: EALing 0011/3 and 3661/5 *Cables:* PULLINCO WESPHONE LONDON

THE

BRITISH AVIATION

INSURANCE COMPANY LIMITED

The oldest and largest office specializing in Civil Aviation

HEAD OFFICE

3-4 LIME STREET, LONDON, E.C.3.

Telephone: Mansion House 0444 (6 lines)

BRANCH OFFICES

EDMONTON
317 Empire Building, Telephone 4-2247

MONTREAL
276 St. James Street West, Tel.: Avenue 8-6135

TORONTO
44 Eglinton Av. West, Tel.: Hudson 5-4461

JOHANNESBURG
401, Prudential Assurance Buildings, 94, Main Street, Tel.: 33-3048

CALCUTTA
2 Hare Street, Telephone: 23-3274

BRUSSELS
99 Rue de la Loi, Telephone: 12.00.05

THE AEROPLANE **PICTORIAL REVIEW (No. 3)**

For the third year in succession, the best and most striking photographs to have appeared in THE AEROPLANE during the past twelve months are gathered together within the covers of one book, to form a brilliant pictorial record of aeronautical progress.

10s. 6d. net *or by post 11s. 7d. from the Publishers*

TEMPLE PRESS BOOKS

Bowling Green Lane, London, E.C.1

Aircraft Furnishing

- PASSENGER & CREW SEATING
- UPHOLSTERY & LOOSE COVERS
- FOAM RUBBER & MOULDED HAIR FILLINGS
- FLOOR COVERINGS—TEXTILE EQUIPMENT
- "KARGO-PAK" FREIGHT CONTAINER
- PASSENGER SAFETY BELTS

Repairs & Renovations

LATEX UPHOLSTERY LTD.

THE LEADING SPECIALISTS

41, LONSDALE ROAD, LONDON, W.11

TELEPHONE BAYSWATER 6262/5

THE VANGUARD SIMULATOR
for
BRITISH EUROPEAN AIRWAYS
is being manufactured by
AIR TRAINERS LINK LTD

First-hand operational experience of electronic simulators, using the more accurate DC analogue computing methods, have led British European Airways to place their fourth order with Air Trainers Link Ltd. for a simulator.
Reliability, a high standard of workmanship and a first-class after-sales service are offered by the manufacturers to all civil and military users of synthetic flight training equipment.

ELECTRONIC FLIGHT SIMULATORS
"TYPE" TRAINERS
GENERAL PURPOSE TRAINERS
— a service that spans the world

Pioneers and leaders in synthetic flight trainers

AIR TRAINERS LINK LTD · ENGLAND

AYLESBURY . BUCKS . ENGLAND Telephone: Aylesbury 4611-7

FOR SALE

184 MATHIS AIRCOOLED

AERO ENGINES OF 200 HP

BRAND NEW NIL HOURED

in original packing cases

Write, phone or cable

ALFRED MEERBERGEN
Aircraft Surveyor
26, rue OSY
ANTWERP (Belgium)

Tel. 31.11.95. Cable: MEERASSUR

OVER 280 PAGES

OF MOTORING FACTS AND FIGURES

The Motor

REFERENCE YEARBOOK, 1959

NOW ON SALE everywhere "*The Motor*" *Reference Yearbook, 1959* is the handy pocket-size, information-packed reference annual for which the motoring world has long been waiting.

Every facet of motoring is represented and the wide-ranging contents include, among many other features:—Detailed Results of every major Sporting Event in 1958, National and International; *The Motor* Road Test Results, Specifications and Prices of over 200 current makes and models; Design Features of 1958 cars; Statistics of Car Production, Exports, Registrations, Taxation and Road Expenditure; Racing Cars of 1958; Principal World Records; Racing Regulations; Lists of Motor Clubs and Motoring Organizations, and sections on Foreign Touring and New Motoring Legislation.

In all, over 280 pages of motoring facts and figures, providing a mine of information into which every motoring enthusiast can quarry happily for hours. *Size: 7 x 4¼ in. 25 illustrations.*

6s. net *or 6s. 9d. by post from*

TEMPLE PRESS BOOKS · BOWLING GREEN LANE, LONDON, E.C.1

ADCOLA
(Regd. Trade Mark)
SOLDERING EQUIPMENT

THE ELECTRONIC INDUSTRIES SOLDERING TOOL FOR THE TRANSISTOR AGE

MANUFACTURED IN ALL VOLT RANGES

DESIGNED FOR CONTINUAL USE ON BENCHLINE ASSEMBLY

ILLUSTRATED ¼" BH Model (Cat: No. 70)

PROTECTING SHIELD (Cat: No. 68)

British & Foreign Patents Reg. Designs etc.

Catalogues from Head Office, Sales & Service

ADCOLA PRODUCTS LTD.
GAUDEN ROAD, CLAPHAM HIGH STREET, LONDON SW4
Telephones: MACaulay 3101 & 4272

GUARANTEED R.L.A.

LAMINATED ALUMINIUM

USED ON MOST IMPORTANT AIRCRAFT
A.I.D. & A.R.B.

B. ATTEWELL & SONS LTD.
IVER BUCKINGHAMSHIRE

E. D. WYNN & CO.
(AIRCRAFT) LTD.

AIRCRAFT INSTRUMENTS AND ELECTRICAL ACCESSORIES

Staverton Aerodrome, Gloucester
Telephone: CHURCHDOWN 3264

WIRE THREAD INSERTS

FOR NEW DESIGNS & SALVAGE

The Cross Wire Thread insert is a coil of wire having a thread form both in the bore and on the outside diameter. It screws into a tapped hole larger than the normal size, has a slight springy interference fit with its mating part and provides a hard smooth thread that will neither come out nor wear out.

CROSS MFG. CO. (1938) LTD.
COMBE DOWN, BATH Tel.: COMBE DOWN 2355/8

NEW BALL & ROLLER BEARINGS
Over 5,000,000 in stock in more than 5,000 types
BRITAIN'S LARGEST STOCKS
WRITE FOR STOCK LISTS
CLAUDE RYE BEARINGS
895-921, FULHAM RD., LONDON, S.W.6
Phone: RENOWN 6174 (EXT. 24) TELEX 23453

THE BRITISH AIRLINE PILOTS ASSOCIATION
95, Mount Street, W.1 Tel.: GROsvenor 6261

Membership open to all Commercial and Service Pilots. For full details as to Objects and particulars of Membership, please write to General Secretary.

OVERSEAS AVIATION
(C.I.) LTD.

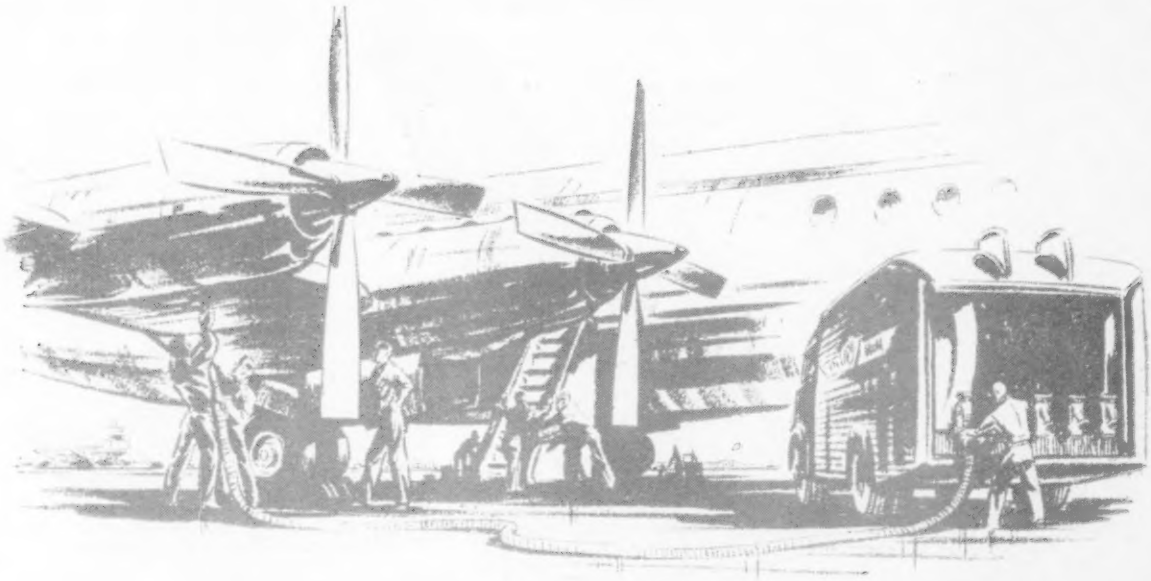
Have Available For World-Wide Charter

65 Seater Argonaut A/C

Payload 6,000 Kilos
Fully Pressurised

Also 36 Seater Vikings

FOR DETAILS PLEASE APPLY
U.K. SALES OFFICE:
PANTON HOUSE, 25, HAYMARKET, LONDON, S.W.1.
Tel: Trafalgar 3901/2 Telex: 21168 (Overseas Ldn.)



First in the fuel line

AVERY HARDOLL - GLOSTER COUPLINGS

These compact units, manufactured under licence by Gloster Technical Developments, are available in a range of standard sizes for aircraft and guided missile fuel systems.

Simplicity of design gives low pressure loss and ensures long life with minimum maintenance.

GLOSTER TECHNICAL DEVELOPMENTS

a division of GLOSTER AIRCRAFT COMPANY LIMITED

Member of the Hawker Siddeley Group

B

. . . . . where air transport is an essential part of the life of the community.

The Dart Herald branchliner is a modern propjet which is cheap to buy and cheap to operate. Powered by Rolls-Royce Darts, it carries up to forty-seven passengers, more than five tons of freight or combinations of both. Its exceptional structure makes possible years of dependable service.

The Dart Herald's speed, substantial range with full load and ability to use small airstrips with indifferent surfaces mean that it is the only aircraft ideally suited to local services and rapid inter-city flights.

DART *Herald*

Engines: Two Rolls-Royce Dart Propjets

HANDLEY PAGE
RADLETT · LONDON · READING

THE AEROPLANE

Incorporating
Aeronautical Engineering
Edited by - - THURSTAN JAMES

© Temple Press Limited, 1959
The proprietors will consider any written requests to reproduce articles and illustrations appearing in this journal. Comment and brief extracts which acknowledge *The Aeroplane* are permissible.

Founder and First Editor: (1911-1939), C. G. GREY

Proprietors:
TEMPLE PRESS LIMITED
Chairman and Managing Director:]
ROLAND E. DANGERFIELD

Head Office:
BOWLING GREEN LANE, LONDON, E.C.1.
Telephone: Terminus 3636
Telegrams:
"Pressimus London Telex"
Telex: 23839

Vol. 96. No. 2483 APRIL 3, 1959

Annual Subscription Rate: U.K. £4.15.0. Overseas £5. Canada and U.S.A. $15.00

SECRECY CAN BE RIDICULOUS

WHEN considered in an objective way there is something really rather pointless and even ridiculous about the secrecy which has befogged the British supersonic transport situation during the past two or three years. No one, in this hard, commercially competitive world, could have expected the Government or anyone else to come out with a blandly confident and detailed statement about our prospective plans—if any. But the taxpayer, who must patiently foot the bill, should surely have been given some directly sensible information about the terms of reference of a committee which met for the first time almost exactly 29 months ago.

Instead, these taxpayers—the unimportant people who will be expected to provide at least £100 million for any project, wildcat or otherwise—have had to be satisfied, during nearly the whole of this long period, with a few inspired guesses. Even when the committee had completed its work and the report had been issued, the best that could be offered were a few ostensibly off-the-cuff remarks by the Minister of Supply at a function on March 13 which had no direct connection with the supersonic business. All he said was to the effect that he now had the supersonic committee's report on his desk; but added that he had not yet had time to study it.

After which his audience might reasonably have asked: "What supersonic committee—and what report?" There has never, so far as we know, been any official statement about the existence of such a committee and certainly none about the reasons for its existence. Long ago, in January, 1957, a more-than-usually zealous aviation journalist got hold of information to the effect that a committee had been formed to study some of the problems that were posed by the supersonic transport. This was not denied by the M.o.S., but no supplementary information was forthcoming.

All the information that is officially available can be summed up by saying that the committee members (different individuals to deal with different aspects of the problem) were drawn from 13 aircraft and engine companies, the two national airline corporations, the Ministry of Supply, and the Ministry of Transport and Civil Aviation, and that the first meeting was held on November 5, 1956. The manufacturing companies represented were: Sir W. G. Armstrong Whitworth Aircraft, Ltd.: Bristol Aircraft, Ltd.; The de Havilland Aircraft Co., Ltd.; English Electric Aviation, Ltd.; The Fairey Aviation Co., Ltd.; Handley Page, Ltd.; A. V. Roe and Co., Ltd.; Short Bros. and Harland, Ltd.; Vickers-Armstrongs (Aircraft), Ltd.; Armstrong Siddeley Motors, Ltd.; Bristol Aero-Engines, Ltd.; The de Havilland Engine Co., Ltd.; and Rolls-Royce, Ltd.

The date of the first meeting—Guy Fawkes' Day—was not inappropriate for the start of work which, so far, has produced neither noise nor smoke. Taking the analogy a little further nobody could blame the organizers of this particular gunpowder plot for being secretive if the direct object had been that of planning a World-shaking explosion of talent. But the plotters in this case appear to have been doing no more than pondering on the best kind of explosion which might be made if such an explosion were considered to be economically and technically desirable and if gunpowder were to be made available.

The necessity for secrecy about sections of the work and planning of the aircraft industry and the Government departments is, if regretted, accepted as inevitable, but for many years the habit of secrecy seems to have been used largely as a means of saving effort. People have, consequently, become mildly suspicious of the motives behind any policy of silence, commercial or otherwise, and those who take the trouble to read through the published Government appropriation accounts are helplessly taken aback by the vast expenditures on projects which, for one reason or another, have come to nothing.

Sound and well-reasoned, if limited, advance explanations of what is being done (and why) would not be too difficult and should, as a public relations exercise, pay off handsomely. At the worst they would leave the public in a position of erring junior partners if the decision is a wrong one; and at the best they would provide the opportunity for free discussions from which, out of all the sense and inevitable nonsense, reasonable decisions would be distilled.

Never has information been more important than in the case of the prospective supersonic transport, which could be a disastrous exercise for the British aircraft industry if wrongly timed or wrongly placed in the speed scale. Already the findings of the committee are being seriously and thoughtfully criticized by many in a position (unlike ourselves) to know what they are. Tight-lipped governmental silence—passed off as necessary technical secrecy or with a condescending "we-know-best" attitude—may prove in this case to be a more-than-usually expensive policy.

Matters of Moment

The R.A.F. High Command

IT has been announced that Air Chief Marshal Sir Thomas Pike, K.C.B., C.B.E., D.F.C. and bar, at present A.O.C.-in-C., Fighter Command, R.A.F., is to succeed Marshal of the R.A.F. Sir Dermot Boyle, G.C.B., K.C.V.O., K.B.E., A.F.C., as Chief of the Air Staff. The appointment is to take effect on January 1, 1960.

Sir Thomas, who is 52, was educated at Bedford School and at the R.A.F. College, Cranwell. From 1950 to 1951 he was A.O.C. of No. 11 Group, and for the next two years was Chief of Staff (Operations), A.A.F.C.E. In 1953 he was appointed Deputy Chief of the Air Staff, a post which he held until 1956.

He will be the second former Cranwell cadet to become C.A.S.; his predecessor was the first. Sir Dermot Boyle, now 54, will have completed four years as C.A.S. at the end of this year.

Air Vice-Marshal H. D. McGregor the new A.O.C.-in-C. Fighter Command.

Succeeding Sir Thomas Pike at Fighter Command is Air Vice-Marshal H. D. McGregor, C.B., C.B.E., D.S.O., who will take up his appointment with the rank of Air Marshal on August 1 next. He is 49, and at present Assistant Chief of Staff (Air Defence) at SHAPE, in Paris, where he has been since 1957.

He was educated at Napier, New Zealand, and was O.C. No. 33 Squadron, R.A.F., in the Middle East from 1938 to 1939. He commanded No. 213 Squadron in 1940, was S.A.S.O., No. 82 Group, the next year. In 1942 was on the Special Planning Staff at Fighter Command H.Q.

In 1943 he was Sector Commander at Tangmere, and for the next year was Deputy Director of Operations, Intelligence and Plans in North Africa and Italy, becoming A.O.C. in the Levant until 1946. He took the I.D.C. course in 1947, and was chairman of the Balancing Committee, Air Ministry, 1948-49.

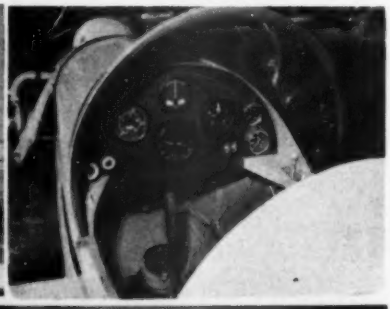
Air Chief Marshal Sir Thomas Pike, who is to become Chief of the Air Staff on January 1, 1960.

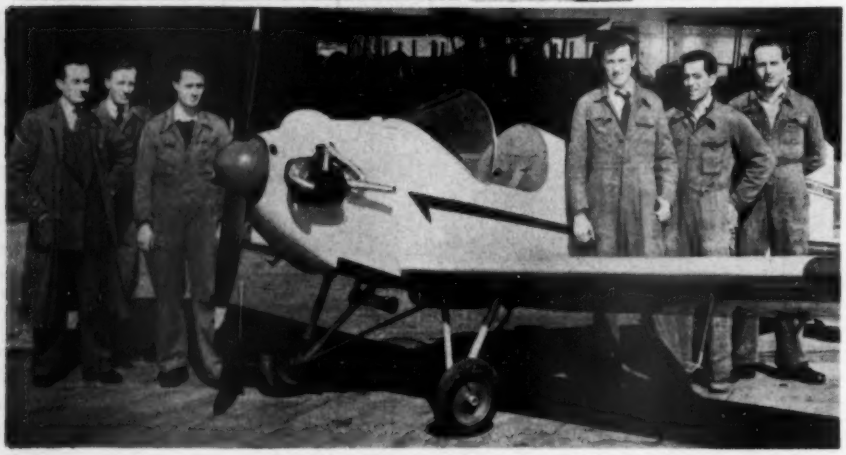
His experience then increased by his appointment as U.K. Air Planner of the NATO Standing Group, and from 1951 to 1953 he was in Germany as A.O.C. of No. 2 Group, 2nd T.A.F. Back in this country he became director, Guided Weapons Technical Development, at the Ministry of Supply, and in 1956 was appointed Assistant Controller of Aircraft at that Ministry.

British Steps Towards Space

MANY conflicting views have been expressed during the past several months on the advisability—or otherwise—of Britain taking a more active part in space research. Our pages have regularly recorded the arguments on both sides of the picture.

Latest of the opinions to be expressed in public on this



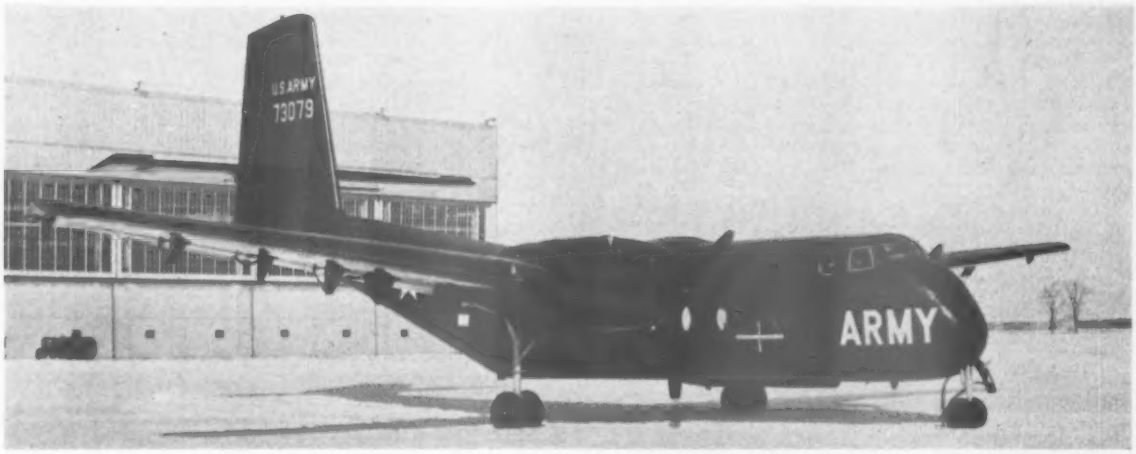


TAILOR-MADE.—On March 23 Air Cdre. G. J. C. Paul, secretary-general of the Air League (top left, centre) took delivery of a Turbulent from Rollason Aircraft and Engines, Ltd., at Croydon; with him are, left, Mr. Norman Jones, and Capt. R. S. Barnaby, U.S.N.(retd.) Top right is the special cockpit. Below are some of the people responsible for building this aircraft; extreme left is Mr. F. Hounslow, in charge of conversions of the Ardem engine.

Photographs copyright "The Aeroplane"

CONTENTS

MATTERS OF MOMENT 390, 405 and 412
NORTHROP SPACE TRAINER 393
NEWS ITEMS 394
AIR TRANSPORT 396
ENGLISH ELECTRIC AVIATION 400
THE FIGHTING SERVICES .. 404
U.S. MILITARY VTOL AND STOL DEVELOPMENTS .. 406
FLYING THE PIAGGIO P.166, by John Fricker 407
PACIFIC CRUISEBIRD, by Capt. Sir Gordon Taylor 410
NEWS OF INDUSTRY 413
PRIVATE FLYING AND GLIDING 414
CORRESPONDENCE 415
NOTES AND EVENTS 416



CANADIAN EXPORT.—The third Caribou built by de Havilland of Canada is the first for delivery to the U.S. Army who have placed a production order. Its first flight was at Downsview, Toronto, on March 13.

subject were those of Mr. P. H. Leyton, the chief rocket development engineer at Saunders-Roe. Announcing his resignation from the Black Knight team, he had something to say about the lack of Government support for a space research programme in this country.

In a letter to *The Times* last week Mr. Leyton commented that "the complete absence of any national policy as to whether Britain should or should not do some work of her own in this new field of scientific and engineering exploration sets an insurmountable handicap to possible future success. . . ."

Mr. Leyton believes that space research will throw up its own problems, the solutions to which will, in the long run, be of benefit to all branches of engineering. He believes, too, that it provides a means of further satisfying natural curiosity about the nature of the physical universe—"a practice which in the past has rarely failed to pay off in the end." He adds that it will also offer the sort of challenge which attracts "the best of our youth into taking up scientific and engineering careers."

However, he is quick to acknowledge the expense that would be involved in taking part in space research and the fact that we could not afford to work on the same scale as the Americans or Russians; nor, he says, could we afford to suffer a series of costly failures. But as he pointed out in his letter —and as Mr. Cornford, of R.A.E., emphasized in his recent R.Ae.S. lecture (THE AEROPLANE for March 27)—projects such as Black Knight and developments of it can be undertaken relatively cheaply. Moreover, it has been demonstrated that successful launching at the first attempt is by no means impossible. And, as explained in THE AEROPLANE last week, the application of our long-range ballistic missile Blue Streak to these astronautical developments has distinct possibilities.

Mr. Leyton has been concerned in one way or another with British guided weapons development since 1951, when he joined the Sperry company to become senior trials engineer on the Seaslug equipment. Later he went to Vickers-Armstrongs (Aircraft) as chief trials engineer. He joined Saunders-Roe in 1956 and has now become director of engineering at Black and Decker, Ltd.

The Best-laid Plans

A COUPLE of weeks ago we found ourselves enthusiastically commending the plans of the Fair Oaks Aero Club to hold an air tour around the country over the Easter holiday. The itinerary included Ipswich, Brough, Sywell, Lulsgate, Roborough and Thruxton.

It is disappointing, therefore, to have to record that this enterprising effort had to be cancelled, particularly as the reason was that members of the organizing club did not give enough support to it.

Just what it is that club pilots want—and this applies not to any particular club but unfortunately to a great many—is not clear. We hear so much about their desire for some form of communal activity beyond the usual local flying, yet when hard-working members of organizing committees get down to providing them with some new interest they adopt a lamentably apathetic attitude.

While in many cases pilots are prepared to lay out money and spend time on a tour which will take them across the Channel—with the greater attendant risk of bad weather and delay—there seems to be a rooted objection to help the private-flying movement generally by a show of keenness and turn it into a more virile body than it is at present.

The general approach to the subject needs a complete revision, and club members and private pilots—whether they fly ultra-lights or larger aircraft—must realize that some effort is necessary if they do not want to play into the hands of departmental officials not particularly anxious for the survival of the movement.

Some months ago the Association of British Aero Clubs and Centres organized a minor competition in an attempt to discover how the movement could be made more interesting and of greater benefit to members. The closing date was November 20; we understand that some very interesting proposals have been made.

A. V. Roe Direction

NEWS of further developments in the reorganization of the Hawker Siddeley Aviation companies, and at Avro in particular, came last week with the announcement that Mr. J. A. R. Kay, F.R.Ae.S., had been appointed managing director of A. V. Roe and Co., Ltd. Since 1955 he has been the company's general manager and in his new post he succeeds Sir Roy Dobson who remains Avro's chairman as well as being chairman of the recently formed Hawker Siddeley Aviation, Ltd.

When Hawker Siddeley Aviation was formed (THE AEROPLANE for January 30) as a new subsidiary company within the Group and as controller of the H.S. Aviation Division, Mr. Kay was appointed as its joint managing director with Mr. J. T. Lidbury. Thus he will now not only be closely concerned with the affairs of the whole of the Group's aviation interests, he

Mr. S. G. Joy who has been appointed general manager of A. V. Roe and Co., Ltd.

will play an even closer part in the direction of the Avro team—with which he has been associated for a good many years.

Succeeding Mr. Kay as general manager at A. V. Roe is Mr. S. G. Joy, who has been the company's secretary since 1938 and a member of the board since 1948. Born in 1902, he has specialized in industrial costing; he joined the central buying department of Armstrong Siddeley Motors in 1918 and became branch accountant in 1921. He joined Avro in 1929 as chief accountant and assistant secretary.

New appointments to the Avro board have also been made. These include Mr. J. T. Lidbury and Mr. S. D. Davies, B.Sc. (Eng.), F.R.Ae.S., both of whom are on the board of Hawker Siddeley Aviation, Ltd—the former as joint managing director. Mr. A. Sewart, M.I.Prod.E., A.F.R.Ae.S.; Mr. J. R. Ewans, A.C.G.I., B.Sc., D.I.C., F.R.Ae.S., and Mr. R. H. Francis, B.Sc., M.Sc., have been appointed executive directors.

Mr. Sewart has been with Avro since 1925 and is assistant general manager (missiles). Mr. Ewans joined the company in 1949 as chief aerodynamicist and was appointed chief designer in 1955; he was with R.A.E. from 1938 to 1944 when he went to Blackburn Aircraft, Ltd. Mr. Francis is chief engineer of the company's weapons division.

Publicizing the R.A.F.

FROM the Air Ministry comes news of a reorganization of the department that is concerned with disseminating information on Service matters. According to the official statement this has come about primarily to satisfy the need to improve the arrangements concerning publicity on recruiting. Air Vice-Marshal G. A. Walker, C.B.E., D.S.O., D.F.C., A.F.C., M.A., has been appointed Chief Information Officer to the Ministry and as from June will be in charge of the Information Division and be responsible for liaison with the Press. The present C.I.O., Mr. L. M. MacBride, O.B.E., is to take up a new appointment as Chief Publicity Officer and will concentrate on the publicity aspects of recruiting.

Air Vice-Marshal Walker was born in 1912 and was educated at St. Bees and St. Catharine's College, Cambridge. He entered the R.A.F. in 1934 and during the War he commanded No. 50 (Bomber) Squadron and subsequently commanded bomber stations at North Luffenham, Rutland and Syerston and the bomber base at Pocklington. He was appointed S.A.S.O. of No. 4 Group in 1945 and later was in the Directorate of Training Operations; was S.A.S.O. of the Rhodesian Air Training Wing; commanded R.A.F. Coningsby; and became A.O.C. No. 1 Bomber Group—a post he has held since 1956.

Mr. MacBride has been Chief Information Officer at the Air Ministry since 1947. Born in 1902 and educated at St. Paul's School he spent many years as a journalist before joining the Foreign Publicity Division of the Ministry of Information at the outbreak of War. After the War, prior to going to the Air Ministry, he was Public Relations Officer to the U.K. High Commissioner in Australia.

Towards Defence in Space

LAST AUGUST, as part of the I.G.Y. programme, three "nuclear devices" were made to explode at a height of more than 300 miles above the South Atlantic. News of this remarkable event was released in America only last week.

Under the code name "Argus," the object of the experiment was to release into the Earth's magnetic field, at a known time and known position, a known quantity of electrons having known energies—and thus provide a means of confirming theory. With the released electrons captured by the Earth's magnetic field and the Explorer IV satellite repeatedly passing by and monitoring the effects, the whole experiment seems to have been most successful.

In a project for which "known" seems to have been the operative word, a good many unknowns must also have been introduced into the wider field of military ballistics. Although primarily intended as a quantitative physical investigation, Project Argus clearly has a much wider significance. If nuclear explosions can be triggered off to the degree of nicety required by a controlled experiment of this sort, it would be logical to suppose that they can be controlled with similar accuracy and assurance of success for the destruction of ballistic missile warheads.

The vehicles used were 57-ft. Lockheed X-17A solid-propellent rockets which were fitted with 1.5-kiloton atomic "warheads." They were fired from the U.S.N. "Norton Sound"—which itself adds to the significance of the event as an indication of the defence potentialities in firing anti-missile missiles from such mobile bases as ships at sea.

Exports at New High Level

AVIATION EXPORTS in February, at £12,528,528, brought the 1959 total so far to £25,540,035, a record for the first two months of any year. This total was an increase of almost 6% over last year's equivalent figure, which itself showed an increase of 45% over the 1957 January-February total.

The February figure was made up of: aircraft and parts, £7,163,367; aero-engines, £4,788,260 (the second highest ever achieved in a month); electrical appliances, £298,441; tyres, £73,026, and aeronautical instruments, £205,434. India was our best customer with £1,420,204 worth of aircraft and parts. Switzerland (£623,873) was next, then West Germany (£614,590), Pakistan (£481,023), South Africa (£463,254), and New Zealand £452,369.

During the January-February period the sale of electrical appliances, tyres and aeronautical instruments rose by 33%.

Air Racing as Before

REGULATIONS just issued by the Royal Aero Club show that the 1959 National Air Races meeting, to be held at Baginton, Coventry, from July 9 to 11, will follow the form set in recent years. The events will be the King's Cup Air Race, the British Lockheed International Aerobatic Trophy contest, and three closed-circuit races for the Kemsley, Osram and the new de Havilland Tiger Moth trophies. The races are not open to foreign pilots, although British pilots may fly foreign aircraft.

Brief details of the races are:—

King's Cup.—Four laps of a 17-18-mile course between the first seven British pilots flying British aircraft to finish in each of the class races. The pilot making the fastest time will receive the **S.B.A.C. Challenge Cup.**

Kemsley Trophy.—Three rounds of four laps of an 11-mile course, the **Air League Challenge Cup** being awarded for the fastest average speed over three rounds.

Osram Cup.—Three rounds of three laps of an 11-mile course, with the **Norton-Griffiths Challenge Trophy** for the fastest average speed.

de Havilland Tiger Moth Trophy.—Three rounds of an 11-mile course, the **Grosvenor Challenge Cup** for the fastest time. This trophy is presented by The de Havilland Aircraft Co., Ltd., and will be contested for the first time this year. As its name implies, this race is open only to Tiger Moths.

Up to 14 aircraft may be entered for each of the class races, which are all handicaps, and entrants will be allotted to their races by the R.Ae.C. "according to their characteristics." The maximum aircraft weight permissible is 3,858 lb.

The British Air Racing Champion will be decided on a points basis, as in the past, according to the number of starters and the order of finish.

Prize money is to be awarded at the end of the three rounds of each class race, dependent on the number of points gained. In each of the Kemsley and Osram events the first five prizes will be £250, £125, £75, £50 and £25; those for the Tiger Moth race will be £100, £50, £25, £15 and £10. No money goes with the King's Cup.

Entries for the races must be received by the R.Ae.C. by June 8; the entry fee is £5 for each round of each class race (£15 per race).

Regulations for the British Lockheed aerobatic competition are similar to those of previous years. The contest is, of course, an international event, and up to 100 points will be awarded for timing and positioning, accuracy, originality and scope, and for artistry. The eliminating trials will be held on Thursday, July 9, and the final on July 11. The entry fee is £10 and the entry list closes on June 8.

The R.Ae.C. has also announced another new trophy, though it is not connected with air-racing. This, known as "Mike's Mug," has been presented by the Steering Wheel Club in memory of Mike Hawthorn and is to be awarded annually "to the pilot considered to have demonstrated most convincingly by his flying the utility of light aircraft for business and executive, as well as private, purposes."

Northrop Space Trainer

A VAST amount of mind and money is now being expended towards boosting the first man into vacuity but, apart from such earthbound research aids as rocket sleds, centrifuges, vacuum chambers and, of course, the now more or less conventional supersonic jet research aircraft, not much thought has yet been expended on the actual flight training technique of the crews who will man these space vehicles of the near future. Or so it might have seemed only yesterday. Today, on the threshold of the North American X-15 flight test programme, with cosmic adventurer Scott Crossfield already airborne tethered to a B-52 carrier (like a baby kangaroo being initiated), at least one other enterprising American design team has been working up the kind of hardware to match the training requirements of space flight, with particular reference to vertical ground launching, high-*g* acceleration, weightlessness, space control operation and the vital re-entry technique associated with a ballistic trajectory.

Rocket Powerplant

Symptomatic of this training for the spurt into space, the Norair Division of Northrop is reliably reported to be offering the U.S. military services and research agencies a rocket-powered version of their recently completed T-38 Talon two-seater twin-jet supersonic trainer, formerly designated the N-156T and first reported in THE AEROPLANE, October 19, 1956. Known in its current project design stage as the N-205, the accompanying artist's sketch (by courtesy of the *Los Angeles Times*) shows the overall similarity of this rocket variant to the T-38; one gathers, in fact, that the N-205 will require modification of only about 25% of the basic T-38 airframe structure, including the use of heat-resistant materials made mandatory because of its much higher speed and altitude. In place of the two General Electric J85-GE-5 afterburning turbojets of the T-38, the N-205 has been planned around three 10,000-lb. thrust liquid propellent rocket motors burning peroxide and JP-5 jet fuel.

With this 30,000-lb. tri-rocket reaction, the N-205, with its two space fringing human aspirants, will be ejected from a missile-like ground launcher at an angle of about 80° to assure fast climb and rapid automatic bailout in an emergency. The three rocket motors would burn for approximately 90 seconds in the launch and boost period, with a peak speed of around Mach 3.2 (2,100 m.p.h.) at a 90,000-ft. burnout height. It would then coast up and over a ballistic trajectory to a maximum altitude of 200,000 ft. Atmospheric re-entry speed would be Mach 2.6 at 150,000 ft., with the subsequent glide speed about Mach 1.3. A typical mission would require about 25 minutes, cover some 80 miles of ground distance, and provide 150 seconds or more of zero-*g* flight compared with the 40 seconds or so parabolic manœuvre now possible with jet aircraft, when simulating the weightless condition of a space flight trajectory.

The launching weight of the N-205 is estimated to gross around 21,000 lb. as compared with about 11,000 lb. for the T-38. The corresponding fuel weights, however, are of the order of 12,000 lb. for the rocket propellent of the N-205 and 3,900 lb. for the jet fuel of the T-38, hence it may be expected that the touch-down speed of the rocket-powered trainer is not appreciably greater than that of its jetted counterpart. Actually, the landing weight and corresponding touch-down speed of the T-38 have been given as 8,000 lb. and 116 knots (133 m.p.h.); thus, if we assume that the trimmed maximum lift coefficient and gross wing area are of the same order for both aircraft, and that the burnt-out empty weight of the N-205 is down to 9,000 lb., then its touch-down speed should be around 123 knots (141 m.p.h.). For comparison, the touch-down speed of the X-15 has been quoted by North American as 180 knots (207 m.p.h.).

Although, in general, the aerodynamic configuration and structural design of the N-205 closely resemble that of the T-38, some differences are apparent, while others may be assumed. Like the X-15, one very obvious additional exhibit in aerodynamic finesse is the mounting of a jettisonable ventral fin at the tail to augment the diminishing yaw stability contributed by the dorsal surface, since at high wing angles of attack, say, in the pullout, the dorsal fin will be largely blanked out by the wide flat profile of the fuselage after-body. Also apparent are the space-type canopy with heavy, rounded port-holes, the streamlined nose blisters blanking off the conventional side air intakes of the basic T-38 fuselage lines, and the installation of wing-tip tanks presumably for additional propellent.

VACUUM TRAINER.—An artist's sketch (courtesy of the *Los Angeles Times*) of the proposed, Northrop N-205 rocket-powered space trainer, a variant of that company's T-38 Talon two-seater jet trainer. Shown inset is the missile-like ground launcher.

Dual Control System

It can also be taken for granted that the N-205 will be equipped with an X-15 type dual function flight control system embracing conventional control surfaces for aerodynamic response within the atmosphere, plus thrust reaction controls for operation in the near-vacuum conditions at the higher levels where the air density is too thin to grip, so to speak. Not so obvious, perhaps, is the suggestion to incorporate an auxiliary rocket motor of about 1,000 lb. thrust "to assure additional power and safety in the landing phase"—to quote from the newspaper reports. Just what precise application is intended has not yet been divulged; indeed, at the time of writing, Northrop publicists blushingly (but gallantly) "de-cline" all comment on their latest brain child.

According to the *Los Angeles Times*, whose space-aviation news reporting may be considered knowledgeable almost to the point of prescience, Pentagon proponents of Northrop's space trainer feel that 30 to 40 of such aircraft will be needed in the near future in order to train the vanguard of America's space crews in the "primary space phase." It is believed by these military planners that the advantages of this type of trainer are realistic at this time, providing a vitally needed method of dual control space training with safe operation and reliability at moderate cost, and with production availability as early as 18 months by virtue of Northrop's current programme with their T-38 jet trainer and the parallel N-156F lightweight fighter project. And so one can nurse the intriguing thought that before man can finally hitch his wagon to the stars, he must first plough the void with a vacuum trainer.—S.H.E.

General Aviation News

NEW FOR NATO.—Seen for the first time in Luftwaffe markings, this Fiat G.91R tactical-reconnaissance fighter also carries the NATO symbol on its fin, having been selected as the first-generation lightweight strike aircraft for the Atlantic powers.

SOUND SUPPRESSION. — Rolls-Royce, Ltd., has entered into a patent licence agreement with Power Jets (Research and Development), Ltd., concerning British Patents Nos. 766985 and 766986 and corresponding patents and applications overseas, in respect of which Power Jets are exclusive licensees. The patents cover inventions which resulted from original work on sound suppression done at the College of Aeronautics, Cranfield, by Prof. A. D. Young and Messrs. G. M. Lilley and R. Westley.

NASA MILITARY RESEARCH. — Although NASA work is devoted mainly to peaceful applications of space technology, its administrator has outlined some of its research on problems affecting the U.S. IRBM, ICBM and anti-missile programmes. This includes studies of warhead heating, warhead stability, stage-separation malfunctions, overheating of a missile's base, wind-induced oscillations, structural strength and lightness, and new high-energy fuels.

META - SOKOL ARRIVAL. — A Czechoslovakian Meta-Sokol four-seat light aircraft is due to arrive in this country in the near future for inspection and test by the A.R.B., with a view to obtaining British validation of its C. of A. The Meta-Sokol will be available for demonstration at Biggin Hill, and anyone interested should contact Gp. Capt. E. L. Mole, of the Aircraft and General Finance Corporation, Ltd., 3 Red Place, Green Street, Mayfair, London, W.1. Provisional price of the Meta-Sokol in the U.K. is £4,400, inclusive of duty.

JETSTAR PLANS.—One of the prototypes of the Lockheed JetStar is to be converted at the end of this year to have four Pratt & Whitney JT-12 turbojets. Flight testing of the first production JetStars with pre-production JT-12 engines will begin in April, 1960, and delivery of F.A.A.-certified JT-12s will begin in October, 1960. The first JetStar is to be delivered to Continental Can Co., before January 31, 1961.

WOBURN "AT HOME."—In our issue of March 20 we stated that a landing fee of £1 would be charged to visitors arriving at Woburn Abbey on May 2. This information came from the organizers, but we are now told that there is no landing fee. A £1 entry fee is payable which will entitle guests to attend the reception, lunch, tea, and a tour of the grounds and abbey.

CANADAIR TOUR.—The prototype Canadair 540 (two 3,500-h.p. Napier Elands) began a 17,000-mile sales tour of the U.S.A. and Western Canada on March 23. The second aircraft of this type is due to leave on a 25,000-mile tour of South America later this month, and the third is coming to Europe in May.

AUSTRALIAN LIGHTPLANE.—The Millicer Air Tourer, winner of the 1953 R.Ae.C. design competition, is to be built by East-West Airlines, Ltd., of Tamworth, N.S.W. This two-seat aircraft, briefly described in THE AEROPLANE of May 16, 1958, should achieve 32 m.p.g. and cruise at 105 m.p.h. The prototype has been built at Melbourne and flight trials are pending. After production of an initial batch of 25 the manufacturers intend to build a four-seat version.

CHEAP SATELLITES. — NASA is developing a four-stage solid-propellent vehicle for high-altitude and satellite experiments. Known as Project Scout, this vehicle will be able to put a 150-lb. payload into an orbit 300 miles up. It is relatively cheap, costing about $500,000, and will be ready for initial tests in 1960.

GANNETS GROUNDED.—A report from Australia indicates that Fairey Gannets of the R.A.N. have been grounded because of "cracking tendencies in the tail frame." At the inquest on March 16 of a pilot killed in a Gannet accident, it was stated that the cracking tendency had no connection with the accident. Fairey's chief engineer in Australia told the court that he believed the failure of the tail assembly was caused by flutter due to variation in aerodynamic loading. This could have resulted from loss of a pin and roller in the rudder.

SNECMA PROGRESS.—Test flights of the SNECMA Coleoptere are pending. This VTOL aircraft is seen here being raised into take-off position.

Military Aviation Affairs

GERMANY'S STARFIGHTERS. — Following extensive negotiation, Mr. Strauss, Federal German Defence Minister, has at last actually signed the agreement with the Lockheed Aircraft Corpn. for the supply of 96 F-104 Starfighters and the manufacture of 200 more under licence. First deliveries are to be made this year. Production in Germany will be undertaken by the Sud-Gruppe, which includes the Dornier, Messerschmitt and Heinkel concerns. The 96 aircraft include 30 two-seat F-104D trainers. The aircraft are to be powered by General Electric J79 turbojets, for which formal agreement has now also been signed.

MALTA CEREMONY.—Detachments of the R.A.F. are to participate in a ceremonial parade at Floriana, Malta, on April 8 to mark the 10th anniversary of NATO and the 6th anniversary of the establishment of H.Q., Allied Forces Mediterranean. There will be fly-pasts.

REGIMENTAL STANDARD.—No. 1 (Field) Sqn., R.A.F. Regiment, is to receive its Squadron Standard at El Adem, near Tobruk, on April 8. This is the first unit of the force to receive its Standard, which will be presented by Air Marshal Sir Hugh Constantine, K.B.E., C.B., D.S.O., A.O.C.-in-C. Flying Training Command, who was a pre-War member of the squadron when it was known as No. 1 Armoured Car Company, R.A.F.

TRAINING AIR CADETS. — The control and training of some 39,000 air cadets in Great Britain became the responsibility of R.A.F. Flying Training Command on March 26. Cadets were formerly under the control of Home Command, which was disbanded on March 31. The A.O.C.-in-C. of Flying Training Command, Air Marshal Sir Hugh Constantine, K.B.E., C.B., D.S.O., assumes the additional title of Commandant of the A.T.C. Air Cdre. J. N. W. Farmer, D.F.C., has been appointed Deputy Commandant. His staff will include Gp. Capts. H. E. Bufton, D.S.O., O.B.E., D.F.C., A.F.C., and J. E. Grindon, C.V.O., D.S.O., A.F.C.

ARMY CO-OPERATION.—Air Vice-Marshal D. R. Evans, C.B., C.B.E., D.F.C., is to become Commandant of the School of Land-Air Warfare, Old Sarum, Wilts, on May 1.

MARTIAL MUSIC. — The fourth R.A.F. Anniversary Concert is to be held in the Royal Festival Hall, London, on April 14. It will be given by the Hallé Orchestra under Sir John Barbirolli and the Central Band of the R.A.F. conducted by Wg. Cdr. A. E. Sims, O.B.E. H.R.H. Princess Margaret is to attend, and invitations have been sent to the 11 surviving members of the R.A.F. awarded the V.C. in both World Wars.

NATO ANNIVERSARY.—To mark the 10th anniversary of NATO a fly-past of allied air forces is to be held at Mainz, Germany, tomorrow, April 4. It will be led by a seven-aircraft formation composed of different types from Britain, Belgium, Canada, France, the U.S.A., West Germany and Holland. Seven national groups, each of 16 aircraft, will follow.

AUSTRALIA'S C-130s ACT.—The first operational test by Lockheed Hercules of the R.A.A.F. was due to be made at the end of March with the carriage of partly dismantled Avon-Sabres to Butterworth, Malaya.

News About People

R.O.C. COMMANDANT.—Air Cdre. J. M. Warfield, C.B.E., who has been A.O.A., H.Q., British Forces Arabian Peninsula, since 1957, is to become Commandant of the Royal Observer Corps on May 4 in succession to Air Cdre. J. H. T. Simpson, D.S.O., A.F.C., who is retiring from the Service. Before going to Aden, Air Cdre. Warfield was A.O.C. No. 66 (Scottish) Group, Home Command, and before that commanded R.A.F. Changi. He entered the R.A.F. in 1930.

MASTER PILOTS.—The GAPAN has awarded Master Air Pilots certificates to the following: Mr. A. G. Anderson, instructing with the Airwork School of Aviation, Perth; Capt. J. A. Fawdon, D.F.C., Hong Kong Airways; Capt. E. R. R. Mackay, senior regional captain with Ansett/A.N.A.; Mr. C. W. W. Turner, of the aviation division of Sir Robert McAlpine and Sons, Ltd.; and Capt. P. C. Ward, B.E.A.

TASMAN APPOINTMENTS. — Sir Hudson Fysh, Air Marshal Sir Richard Williams, and Mr. W. C. Taylor have been re-appointed directors of Tasman Empire Airways, Ltd., for three years from April 1.

R-R IN CANADA.—Mr. A. M. Scott has been appointed to the newly created post of chief engineer of the aero division of Rolls-Royce of Canada, Ltd., at Montreal. Mr. K. J. Bhore has succeeded him as sales manager, aero.

CLOSING DOWN.—Home Command, R.A.F., was disbanded on March 31. Seen here at a recent "good-bye" party at White Waltham are: Air Marshal Sir Douglas Macfadyen, C.-in-C. (centre), Air Cdre. A. L. Derry (left) and Air Cdre. A. E. Clouston.

VICKERS AWARDS.—Maj.-Gen. Sir Charles Dunphie, chairman of Vickers-Armstrongs (Aircraft), Ltd., recently presented prizes to apprentices at Weybridge. R. M. W. Manning is here seen receiving the Weeks Trophy as the outstanding apprentice of the year.

TO LUTON.—Mr. John W. S. Overbury, who was formerly a test pilot of Saunders-Roe, Ltd., has joined the test-pilot team of Hunting Aircraft, Ltd. He has flown about 2,600 hr. on 70 different aircraft types. He served as a Royal Navy pilot from 1943 to 1956, is a graduate of the E.T.P.S. and was also with the Naval Test Squadron at Boscombe Down.

Commercial Aviation Affairs

NORTH-SOUTH SERVICE.—Using a Heron, North-South Airlines plans to operate a service from Leeds/Bradford Airport to Exeter, Bournemouth and the Isle of Wight on Saturdays between May 30 and September 26, and on Sundays in July and August. B.K.S. Air Transport is handling all bookings and inquiries for the services.

TV BRIEFING.—Philips equipment has been installed at Dublin Airport to provide a closed-circuit television system between the Met. Office and the operations room where Aer Lingus pilots can now obtain pre-flight weather briefing. Up to 20 minutes of a pilot's time is thus saved by avoiding journeys to the Met. Office.

MID-ATLANTIC OPERATOR. — Guest Aerovias Mexico inaugurated a transatlantic service between Miami and Paris on March 21. The service is operated initially once weekly with a DC-6 (purchased from S.A.S.) arranged for first-class and economy passengers. S.A.S. is providing a comprehensive programme of technical assistance and is serving as general sales agent for Guest throughout the World.

EXCHANGE NEWS.—A feature of the 11th *Market Report* issued by Aircraft Exchange Inc. was the inclusion of new Fairchild F-27s offered on a long-term lease-purchase basis by a leasing company. The Exchange is seeking to extend this type of offer through its activities. Also offered for the first time were four Douglas C-74s (the original Globemasters) available on lease at $15,000 per month.

P.A.A. AND A.L.P.A. AGREE.—An 18-month contract providing for trans-atlantic jet pilots to earn up to $33,000 a year has been signed between Pan Am and the Air Line Pilots' Association. The agreement also provides for the provision of a third pilot in jet cockpits in addition to a flight engineer.

CARAVELLE CEREMONY. — The first of Air France's Caravelle fleet was named "Lorraine" by Mme. de Gaulle on March 24. Air France now plans to introduce the Caravelle on May 12 on the Paris-Istanbul route, and on Paris-London and London-Nice routes in June.

THE NEW B.E.A. LINE.—Comets and Vanguards of the B.E.A. fleet are to have a striking new colour scheme, comprising bright red wings (top and bottom surfaces), white fuselage top and tail unit, and broad black trim line.

Air Transport

Moscow Service Agreed

AN exchange of notes bringing into effect the air services agreement between Britain and the U.S.S.R. was signed in Moscow on March 24. As a result, services between London and Moscow operated by B.E.A. and by Aeroflot are expected early this summer.

Discussions between the British and Soviet governments with such a service in view began in 1957 and a provisional air agreement was signed in London on December 19, 1957. This was followed by an exchange of technical missions early in 1958. On February 26, 1958, B.E.A. and Aeroflot signed a provisional interline agreement.

The major stumbling block in recent months has concerned the ability of the Tu-104 to comply with the operating conditions laid down by the M.T.C.A., particularly so far as noise is concerned. Announcing the exchange of notes in the House of Commons on March 25, Mr. Harold Watkinson said "I have to be satisfied that these new jet aircraft do not create conditions that are intolerable for people living round the airport, and I am grateful to Aeroflot for meeting, so far as they are able to do, the rather strict operating requirements we had to set."

Under the terms of the agreement, the Tu-104 will employ operating techniques and procedures designed to minimize the disturbance caused by noise. These will include the use of only one runway for take-off. The operations will be reviewed in due course, when sufficient experience has been gained to show whether the initial conditions should be varied.

Initially, B.E.A. will use Viscount 806s on their service to Moscow, which will be via Copenhagen and will have a flying time of about six hours. The Comet 4B will be used later and may operate the service non-stop. Tourist-class fare will be £66 single and £118 6s. return. Discussions between Aeroflot and B.E.A. still have to be held to agree the operating schedule, which will probably be two services a week each.

Prestwick Accident Report Aftermath

IT is difficult to see what was really behind the series of questions and answers in the House of Commons on March 25 about the Prestwick accident investigation—the report of which is summarized on p.399 of this issue.

Without more detailed background information it is not reasonable for us to comment on the justification or otherwise for the complaint that the captain's rights have not been properly protected. As we explained on p.368 of last week's issue, there is no legal necessity to hold a public inquiry into any particular accident, and, as the Minister said, the purpose of the investigation was to discover the cause of this accident rather than to ascertain who was responsible. Nevertheless, the responsibility for the accident was, in fact, laid on the pilots, who, we understand, are no longer in the employment of B.E.A., the operators of the aircraft.

The discussion in the House was made somewhat confused by the references to the dangers of altimeter-misreading and by the suggestion that the Ministry should have done something about these dangers a long time ago. It is difficult to agree with this view—or with the view that pilots should have been officially warned about the danger. The three-needle altimeter has been with us for a long time; every pilot has known perfectly well during this time that, by the very nature of its presentation, misreadings are possible and must be guarded against; and accidents from this cause have been rare, and have certainly not given prominence until comparatively recently. Pilots are surely not children who must be given official warnings in writing of dangers which are quite obvious.

More important, one would say, is the fact, given in the accident Report, that the captain and the first officer had not worked together, or even met, before this disastrous flight to Prestwick. In the circumstances the captain could presumably be exonerated for his decision not to operate the aircraft according to accepted B.E.A. procedures—a decision which appears to have been the underlying cause of the accident. Even so, an onlooker can only make the comment that, however the responsibility on the flight deck may have been divided in this particular case, the "mislaying" of 10,000 ft. during the routine airline operation described in the Report cannot be looked on as anything but a lapse in good airmanship.

Airwork Fleet Disposal

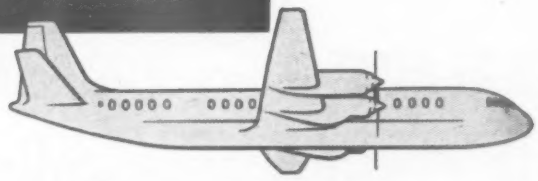
AS part of a general reorganization which has been going on for a good many months now, Airwork, Ltd., is disposing of eleven of its aircraft between now and the end of the summer. The aircraft for sale are two Viscount 736s, used until recently on the Safari colonial coach service; three Hermes, in use until the end of May for trooping to the Far East; four Viking 1Bs in use for inclusive tours until the end of the 1959 season; and two Dakotas of the Transair fleet.

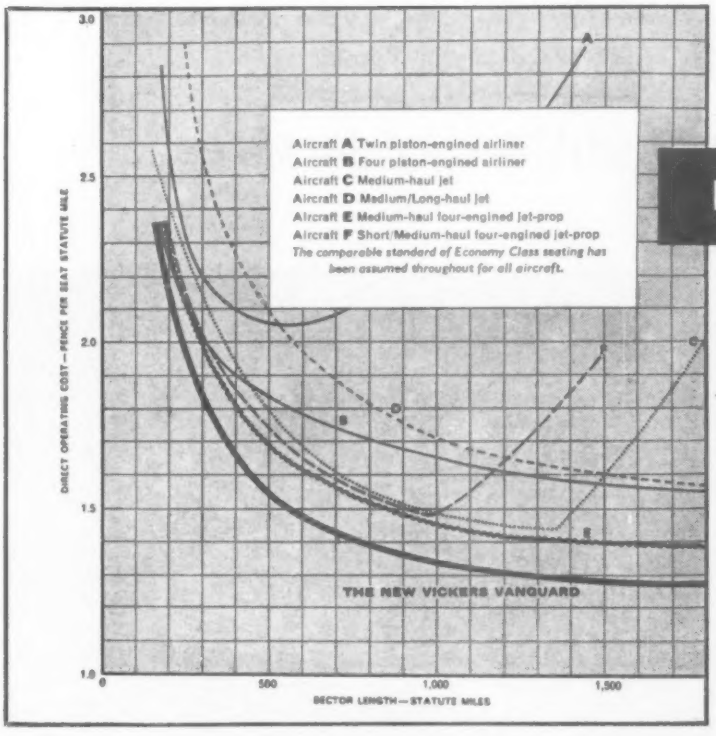
The aircraft offered for sale are described as "surplus to the Group's fleet requirements." With the exception of the two Dakotas, they are all operating in Airwork's own livery, and comprise the entire Airwork fleet with the exception of three Viscount 831s. Other companies in the Airwork Group are Transair, operating ten Dakotas and three Viscounts; Air Charter, with two Britannias, three DC-4s, five Super Traders and nine Bristol 170s, and Morton and Olley Air Services with a collection of Rapides, Consuls, Doves and Herons.

These moves by Airwork, it can be fairly forecast, will lead in due course to the formation of a single new operating company which will take over the work being done at present under four different names.

RECOGNIZED ACHIEVEMENT.—The 1959 Edward Hulton Achievement Award has gone jointly to de Havillands, Rolls-Royce and B.O.A.C. for their introduction into service of the Comet 4. Sir Edward Hulton made the presentation on March 25 to Sir Geoffrey de Havilland, Lord Kindersley and Sir Gerard d'Erlanger representing the three groups.

LOWER FARES





yet

MORE PROFIT

The attraction of cheap rate tickets has already been proved on long distance routes. On North Atlantic flights 60% of all passengers now travel at economy fares.

A similar cut in fares would be equally popular on short and medium-haul routes, and be the means of boosting traffic considerably. The only aircraft capable of bringing about these reductions, *and* making a profit, is the Vickers Vanguard.

In its economy class layout, the Vanguard has over 50% greater profit potential than any competitive air liner. By a substantial margin its seat-mile costs are the lowest on offer today.

Only the VANGUARD has all these features

425 m.p.h. cruising · Seat-mile cost as low as one cent per seat-mile · Freight capacity 10 tons at normal densities · Full routing and A.T.C. flexibility · Can use normal existing airfields · Quick turn-round · No airfield noise problems · Quiet, smooth flight · Ten years' unique Vickers Rolls-Royce jet-prop experience.

What fare cuts are possible?

At 65% passenger load factor the new Vanguard, in its 139-seater economy layout, can operate at 10% clear net profit with fares ranging from 29-50% below current tourist rates. In calculating these figures actual routes, current fares and current costs have been used.

PROFIT with the NEW

VICKERS VANGUARD

FOUR ROLLS-ROYCE TYNE TURBO-PROP ENGINES

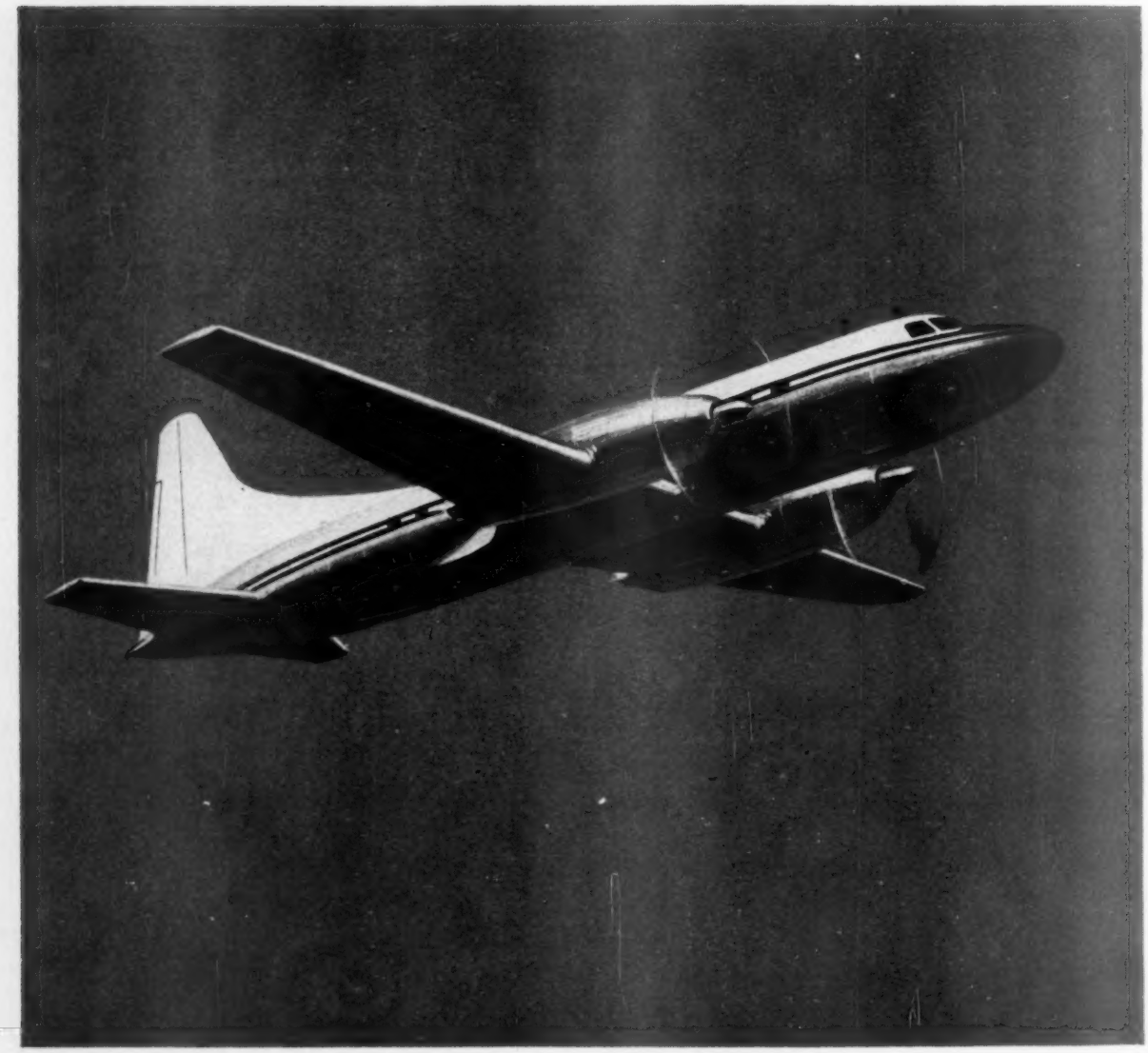
VICKERS-ARMSTRONGS (AIRCRAFT) LIMITED WEYBRIDGE SURREY

TGA AT599

D

Introducing a new standard of

FIRST jet-prop aircraft
with engines specifically
designed for use on fast,
multi-stop, inter-city services;



inter-city airline transport:

FIRST with adequate growth potential for increasing traffic densities on short-to-medium routes.

CANADAIR CONVAIR 540

JET-PROP AIRLINER

The "540" combines the airframe of the world-renowned Convair "440" Series . . . proved in over 6,000,000 hours of service . . . with Napier Eland 3,500 e.s.h.p. jet-prop engines. The result is a fast, flexible new aircraft that has excellent performance characteristics and earning power.

FIRST — The Canadair-Convair 540 is the *first* airliner with engines specifically designed for the rigorous up-and-down life of short stage operations, and offers a new standard of economy.

FIRST — The *first* airliner with such great growth potential. Standard seating capacity of 48 can be increased by 20% to 58, still with three feet of leg room per seat. This growth potential, *plus* the proved performance of the airframe, means a useful life of at least 15 years.

Here are more examples of its outstanding characteristics:

- FASTEST IN ITS FIELD—Up to 340 m.p.h. at 20,000 ft.
- GREAT FLEXIBILITY—Equally at home in a series of short hops as it is on medium ranges and at all altitudes up to 20,000 feet . . . operates out of all close-in and most smaller fields.
- LOW OPERATING COSTS—As economical as a piston aircraft in stages as short as 80 miles . . . simplified maintenance lowers cost of training.
- EXTRA FUEL CAPACITY—Sufficient for most routes terminal to terminal...three 350-mile stages without re-fuelling and without weight or space limitations.
- GOOD EARNING ABILITY—Profitable even with moderate payloads.
- CARGO AND EXPRESS CAPACITY—An additional profit opportunity: 788 cubic feet of easily accessible space.
- QUICK TURNAROUND—Self-service baggage racks and self-contained stairway speed departures and arrivals.

MOST IMPORTANT TO YOU

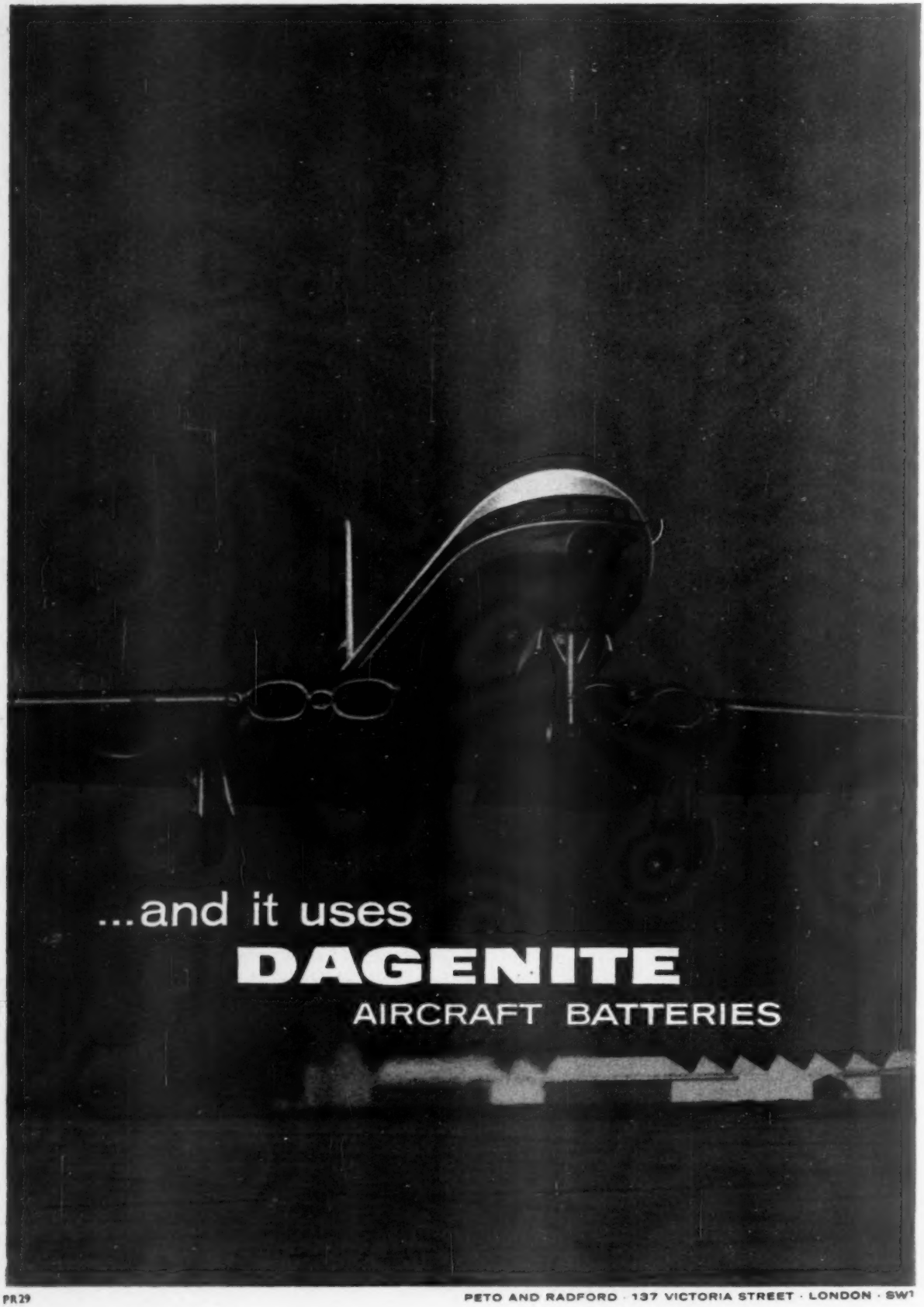
The Canadair-Convair 540 is a product of the combined experience and facilities of two of the world's great aircraft producers—Canadair Limited of Canada and Convair — both members of the General Dynamics family of companies.

Your request for detailed information on the Canadair-Convair 540 will receive our immediate attention: contact our European representative: J. H. Davis, Princes House, 190 Piccadilly, London, W.1., England.

CANADAIR, Montreal, Canada

Canadair is a subsidiary of General Dynamics Corporation

CA 59-540-21 UKT



PR29

PETO AND RADFORD · 137 VICTORIA STREET · LONDON · SW1

V.L.F. on TV

EVIDENCE of the widespread interest in the very low fares proposed by three British independent operators on certain Commonwealth routes was the attention given to this topic on B.B.C. Television's "Panorama" programme last week. Mr. Keith Granville, deputy managing director of B.O.A.C., and Mr. Maurice Curtis, managing director of Hunting-Clan Air Transport, were on hand to put their respective points of view to Mr. Woodrow Wyatt.

Naturally, in five minutes or so of closely controlled discussion, neither speaker could do justice to his views. In essence, however, Mr. Granville presented B.O.A.C. as one of the World leaders in low-fare programmes, prevented only from introducing still cheaper air travel within the Commonwealth by the opposition of foreign operators and the British independents. The Corporation objected to the proposed new services because they would "skim the cream" off existing traffic; because they would give the independents a foothold in countries soon to become independent; and because the low standard of cabin service to be offered was not a good idea.

The independent carriers, through Mr. Curtis, claimed that the services would be fully economic in their own right; that they would generate a new class of traffic and would be adequately comfortable although of a lower standard than existing services—as they had to be to obtain official approval at all. The independents had not supported B.O.A.C.'s new low-fare proposals because they had been almost identical with Colonial Coach fares already applicable and would not have generated new traffic.

As we noted last week, the A.T.A.C. hearing into the applications by Eagle and Hunting-Clan/Airwork is to begin on April 3. Since the type of service offered conforms to the Government's general requirements as applied to Colonial Coach services, the two major issues seem to be whether the new services will "materially divert" traffic from B.O.A.C., and whether they can be self-supporting at the low fares suggested.

The question of economy has been very thoroughly studied by the independents, who have made their application in no mood of frivolity. The essence of the argument here is that very low frequency service (once or twice a fortnight) over a collection of routes entails a low class of service but, at the same time, provides very high aircraft utilization and, it is estimated, very high load factors. Two or three Britannias or DC-6Cs would be wholly occupied flying the network proposed—and it follows that the scheme must be accepted or rejected as a whole; to approve one or two routes and to deny the others would destroy the basis of the proposal.

Clarifying a Comet Accident

DURING more than six years the fundamental causes of the fatal take-off accident on March 3, 1953, to the Canadian Pacific Comet 1A at Karachi have been the subject of intermittent discussions amongst pilots and others. Now, at last, something of the background to this accident has been explained in a joint statement by the International Federation of Air Line Pilots' Associations and The de Havilland Aircraft Company.

Within a very few months of this accident—which followed a somewhat similar one at Rome in October, 1952—the word had got round that the facts in the summary of the report of the investigating authority in Pakistan had been rendered incomplete by the results of take-off tests made at Hatfield. No full report of the accident was made public, so judgment of the various factors involved was necessarily based on inspired gossip. In an effort to clarify the situation THE AEROPLANE published articles and letters from both BALPA and IFALPA during 1954 and 1955, but these failed to draw explanatory comments from the authorities and others concerned.

The Karachi accident occurred during the delivery flight of the first C.P.A. Comet 1A, CF-CUN, to its operating base at Sydney, Australia. The aircraft overran the runway boundary, crashed and burnt out; the crew of five and six technician passengers lost their lives. It had been fuelled for a non-stop flight from Karachi to Rangoon (1,690 n. miles), was at near-maximum permissible weight (114,868 lb.), and was using water injection. For the 7,500-ft. runway (plus 650 ft. of overrun) in high-temperature (73° F.) conditions the take-off was a critical one and was being made at night. The summary of the official report put the cause of the accident down to the excessive lifting of the nose during the take-off run in circumstances which "required strict adherence to the prescribed take-off technique, which was not followed."

Because of the unusual circumstances, both of the accident and of the discussions which followed during succeeding years, we are quoting the IFALPA/de Havilland statement in full.

"From an early stage in the flight testing of the Comet 1 aircraft, it had been realized by The de Havilland Aircraft Company that, in common with most jet aircraft then flying, a large increase in drag and consequent reduced rate of acceleration resulted from a high nose-up attitude during the take-off run, and for some time before this accident all Comet pilots, including the crew of the aircraft involved in this accident, had been taught a technique, adherence to which ensured that the aircraft did not get into this high-drag condition. The technique was described in the Flight Manual in use at the time of this accident as follows:—

"'At all weights and centre of gravity positions the nose-wheel should be raised at a speed of 80 to 85 knots I.A.S. Having raised the nose-wheel, it is important that the control column be returned forwards without delay to bring the nose-wheel very lightly in contact with the ground, thus avoiding the poor acceleration associated with an unnecessarily nose-high altitude.

"'When, and not before, the scheduled unstick speed is achieved, the aeroplane should be unstuck by a firm, controlled rearward movement of the control column. Immediately the aeroplane has left the ground the control column should be moved forwards again to check the vertical movement away from the ground and any tendency to pitch nose up; after which climb-away is initiated by a gentle backward movement of the control column when the airspeed indicator reads about 4 knots above the scheduled unstick speed.'

"A further extensive series of special tests was carried out after the Pakistan enquiry, which confirmed the accuracy of the scheduled performance figures provided the prescribed technique was followed, but revealed a hitherto unrecognized feature that the stalling speed near the ground was higher than the corresponding figure in free air and that this disparity increased as the aircraft weight increased. The safety margin at the highest take-off weights was thus found to be smaller than that indicated by the certification flight trials.

"It was found that, at the weight at which the accident occurred, the scheduled unstick speed (122.5 knots E.A.S.) was 5¼ knots above the ground stalling speed. However, the Flight Manual technique called for unstick procedure to be *initiated* at the scheduled speed, and in this technique the speed of the aeroplane rose by a further 3¼ knots during the time in which the aeroplane was rocking up to its unstick attitude. The total effective margin was therefore 9 knots at the instant of unstick.

"While The de Havilland Company have throughout been satisfied that the techniques which they taught satisfactorily avoided any difficulties inherent in the somewhat narrow margin of speeds, they recognize that the aeroplane had a smaller margin for departures from its prescribed technique than contemporary piston-engined aircraft. They point out, on the other hand, that no practicable increase in unstick speed would have safeguarded the aeroplane, when operating at high weights, against the consequences of departure from the proper technique in lifting the nose early in the take-off run.

"This experience of jet aircraft has also been recognized internationally in recent months by proposals for the introduction of new take-off specifications. These state that the elevator control movement to initiate unstick shall not be made at a speed lower than 1.1 times the minimum speed at which the aeroplane can be made to lift off the ground and continue the take-off, without displaying any hazardous characteristics (except that, for aeroplanes where the minimum speed is limited by landing-gear geometry or elevator effectiveness, the factor may be reduced to 1.05).

"Although The de Havilland Company were satisfied that, if the recommended take-off drill was followed, the aircraft was perfectly safe on take-off, they decided that, to ensure a much wider margin for error, a modification to the leading edges of the wings of Comet aircraft should be installed. This modification has been incorporated in the Comet 1As which are now flying on military duties and also to all variations of the Comet 2 in service with the R.A.F.

"The Comet 4 now in service has been demonstrated at all weights to be incapable of being stalled even with the tail-bumper in contact with the ground, and to suffer no prolongation of take-off distance when taken off in this attitude."

The Electra in Australia

ANSETT-A.N.A.'s first Lockheed Electra—the first in service outside America—made, a correspondent writes, an impressive début on the Melbourne-Sydney run on March 18. The Electra is making four return trips a day with a 35-minute turn-round at each end and, on the first day, was almost consistently fully loaded, carrying nearly 600 passengers during the period.

A flight to Sydney on this opening day left the passenger with two overriding impressions, one good and one bad. On the one hand, Lockheed must be given credit for the low cabin noise-level achieved and for an outstanding lack of "wave" vibration seemingly due to perfect propeller synchronization. It is a pity this excellence is offset by the poor passenger view, except from extreme front and rear seats, caused by the high position of the engine nacelles.

Ansett-A.N.A. will extend the service to Brisbane when the second Electra arrives in about a month and is already negotiating with the Government for a third aircraft. T.A.A.'s first Electra is due about June.

Airport Programmes

IN the year starting April 1, 1959, the Ministry of Transport and Civil Aviation estimates capital expenditure of nearly £6 million on "works, buildings and lands" at airports in the U.K., including £4,520,500 for new works, additions and alterations. This is the major item in the Ministry's estimate of £14,651,500 to be spent on civil aviation in 1959-60—some £2,242,000 more than in 1958-59—according to the Civil Estimates, 1959-60, Class IX (published by H.M.S.O. last month, price 8s.). Almost all of the additional expenditure is due to the cost of new works at 13 airports.

Details of the work in hand at these airports are summarized below. Dates in brackets are the financial year in which the work concerned was started or was first provided for in the estimates and the costs quoted are the current total estimates, including in some cases sums already spent, or to be spent in future years.

Belfast (Nutts Corner). New office block (1956-57), £23,000; development of terminal area (1959-60), £325,000.

Birmingham (Elmdon). Extension of terminal building, apron and runway (1957-58), £325,000.

Blackbushe. Improvements to hangars (1958-59), £84,000; new water supply main (1959-60); £15,500.

Cardiff (Rhoose). Extension of terminal building (1957-58), £19,000; extension of runway (1957-58), £23,000.

Edinburgh (Turnhouse). Extension of terminal building and apron (1959-60), £180,000.

Gatwick. Total estimated capital expenditure related to construction of one runway and terminal and maintenance facilities (Stage I) is now approx. £5,200,000. This includes £2,342,000 for runway, taxiways and terminal aprons; £1,533,000 for terminal and ancillary buildings; £492,000 for river diversions and surface water drainage; and £226,000 for power supply. A new programme of hangar accommodation (1959-60) is estimated to cost £100,000.

Islay (Port Ellen). Strengthening of runway (1959-60), £128,000.

Kirkwall (Grimsetter). Extension and strengthening of runway (1959-60), £201,000.

Liverpool (Speke). Widening of taxitracks (1959-60), £11,500.

London Airport. Scheduled for initial expenditure in 1959-60 is the new long-haul passenger building in the central area at a total cost of £3,107,000, including £2,343,000 for the building itself and £495,000 for apron development. Programmes continuing in 1959-60 include: hangar annexes, hardstandings, etc., £222,000; aprons, ancillary buildings in central area, heating station, etc., £1,245,500; development of maintenance area, £481,000; heating station, services, etc., in central area, M.T. depot, £942,000; improvements and aprons in central area, improved main access and road works, etc., £1,064,000; apron development in central area, development of maintenance area, £870,000.

Prestwick. Strengthening and extension of runway (1957-58), £360,000; strengthening of taxitrack (1958-59), £103,000; extension of main runway (1959-60), £517,000.

Renfrew. Terminal area development (1952-53), £301,000; extension of new terminal building (1956-57), £192,000.

Manchester (Ringway). Contribution to cost of development, £700,000.

Stansted. Improvement of terminal apron and taxiway, and new office accommodation (1959-60), £80,000.

Among other items of expenditure in 1959-60 estimated by the Ministry is the sum of £19,500 granted to B.E.A.'s helicopter experimental unit; £80,000 for grants to flying and gliding clubs; and £137,000 for Britain's subscription to ICAO.

Qantas' 707 Services

A TWICE-WEEKLY London-Sydney service with Boeing 707-138s will be started by Qantas Empire Airways on July 31 via the U.S.A. and the Pacific with traffic stops at New York, San Francisco, Honolulu and Fiji. Two additional weekly trans-Pacific services, connecting with B.O.A.C.'s Britannia services at San Francisco, will be started by Qantas on August 18. The elapsed time for the London-Sydney service via the U.S.A. will be 38 hours.

Qantas has seven 707s on order and when the fleet is complete later this year they will be introduced on the England-Australia route through the Middle East and Singapore.

The 707-138 is Q.E.A.'s variant of the short-fuselage JT-3C-4-powered 702-120 which was originally given the model designation of 707-120B. The shorter fuselage gives this version, in effect, a better range and speed performance than that of the standard -120 at the price of a reduced capacity payload—a payload which Qantas does not need for its long-haul services. The fuselage length is 134 ft. 6 in. by comparison with the 144 ft. 6 in. of the standard -120.

Electra Investigation

WHEN American Airlines' Electra crashed into the East River while on the final approach to La Guardia on February 3, it was being flown by the automatic pilot and the altimeters were reading 500 ft. This was stated by the co-pilot (one of eight survivors among the 72 occupants) during a public inquiry held in New York on March 18-20 by the C.A.B. The inquiry reached no conclusion, but will form the basis of the formal report by the C.A.B.

First Officer Frank Hlavacek said that both the Kollsman

CONVAIR TWINS.—The third Convair 880 (left) is expected to make its first flight early this month. It is seen here with the first aircraft which, on the day this picture was taken, had completed 42 hr. 40 min. in the air in 20 flights. The second 880 is undergoing proof load tests and the third is the first equipped with thrust reversers.

LONG ISLAND HABITANT.—Posed dramatically over eastern Long Island, N.Y., the prototype Grumman Gulfstream twin-Dart executive liner is seen on a test flight. Three Gulfstreams are now engaged in the certification programme.

altimeters (which were of the single-needle-and-drum type—see THE AEROPLANE for March 6, p. 277) read 500 ft. at the moment the aircraft struck the water. There had been no indication that anything was wrong with them during the flight from Chicago. Both he and the flight engineer, Warren E. Cook, testified that they had seen nothing through the windscreen before the impact; two pilots in a Northeast Airlines DC-3 which landed a minute or two ahead of the Electra, on the other hand, reported no difficulty in seeing La Guardia's runway from 400 ft., the height of the cloud ceiling. Visibility was given as two miles, with light rain and fog.

According to evidence given at the hearing, Capt. De Witt (who was killed) had failed the first instrument approach check for his Electra rating, but had passed next day after four more hours' training. An American Airlines' regulation that pilots with less than 100 hours on a new type should observe a 100-ft. higher ceiling and half-mile greater visibility than the normal minima for instrument landings had been waived in Capt. De Witt's case after about 25 hours. The flight engineer said that he was making small throttle corrections on the final approach under the captain's direction; this procedure was forbidden by the airline's flight manual.

The hearing was characterized by clashes between counsel representing the various interests, especially Kollsman and American Airlines. Mr. Joseph Minetti, member of the C.A.B., presided. Since the accident the C.A.B. has required the installation, at least temporarily, of the older three-needle type of altimeter in the Electra, and American Airlines issued new instructions requesting captains to disengage autopilots in good time to allow adjustment to manual control, unless a full ILS was available. The runway which was being approached by the Electra had no ILS glidepath facilities.

Boeing 707 Investigation

INVESTIGATION in public of the circumstances of the incident in which a Boeing 707 went out of control over the Atlantic began in New York on March 11, and was to continue in Seattle on April 1. The incident occurred on February 3 when the aircraft was flying from Paris and London to Gander and led to a spiral dive from 35,000 ft. to 6,000 ft.

Evidence given in the two-day hearing at Idlewild showed that neither the pilot on duty nor the flight engineer could say for certain whether the autopilot (a Bendix PB-20) was actually flying the aircraft just before the dive started. According to press accounts of the hearing, incidents in which the 707's autopilot had disconnected in flight had previously been encountered, and the flight engineer on the particular 707 in question had reported, after a flight last December, that the autopilot tended to pitch the aircraft's nose down from time to time, and "occasionally breaks loose," diving the aircraft.

A spokesman for Bendix Aviation Corp. said three defects had been found in the autopilot, but that none could account for the dive. A P.A.A. engineering supervisor said that, since the incident, cases of the autopilot disconnecting had been found to be occurring more frequently than previously reported by crews.

Prestwick Accident Report

A MISREADING of the altimeter by 10,000 ft. was the cause of the accident to a B.E.A. Viscount 802 near Prestwick on April 28, 1958, according to the report of the investigation published by H.M.S.O. The accident occurred on a non-scheduled flight from London to Prestwick with no passengers; the crew of five—two pilots and three cabin staff—were injured. The report noted that a somewhat ambiguous presentation of height on the (three-needle) altimeter may have initiated the misreading, but that lack of co-operation between the captain and first officer, and lack of alertness on the part of the latter, were the main contributory factors.

The Viscount (G-AORC) was commanded by Capt. W. H. Hankin, D.F.C., who, until this flight, had not met First Officer B. Fleming. The latter had not been to Prestwick since the War, and these factors together, apparently, influenced the captain in his decision not to use the B.E.A. "monitored approach system" which has been standard procedure since November, 1956. In this system, the first officer flies the aircraft on instruments from the start of the descent until the captain takes over for the landing; the captain monitors and directs the flying, communicates with ATC and remains free to control the situation.

Although the autopilot was engaged, the captain in this case was controlling the descent and monitoring his instruments; was doing all the RT after the start of the descent; writing down weather reports; studying the approach and overshoot procedures; briefing the first officer on a possible overshoot; attending to descent and initial approach drills; and checking the altimeters.

The initial error was made at 4,500 ft., when the captain glanced across at the first officer's altimeter (because it was still on Zone QNH, whereas his own was on QFE) and read it as 14,500 ft. This error was subsequently perpetuated at 2,500 ft. and 1,000 ft., when the captain read his own altimeter as 12,500 and 11,000 ft. respectively. The report suggests that he lost mental note of the descent sequence because he had overloaded himself.

English Electric Aviation

A new company within the Group

REORGANIZATION is the vogue in the aircraft industry today, and many of the leading companies have made changes to meet the new conditions which face the industry. One of the most recent to do so has been English Electric, which has formed a new company—English Electric Aviation, Ltd.—to take over the research, design and development activities of the English Electric aircraft and guided weapons divisions at Warton, Stevenage and Luton. Its aircraft and missiles will be manufactured in the works of the parent company, of which English Electric Aviation is a subsidiary.

Why have such changes been made? What are the resources and activities of this new company and how will it be run? How will other English Electric subsidiaries with aviation interests be affected? It is to answer these questions that this article has been written.

Perhaps the first thing to remember is that the English Electric interests in aviation go back many years. The company did not enter the field as a major aircraft manufacturer just after the Second World War as many may think; its aviation activities go back to 1911, as the historical survey at the end of this account makes clear.

Although the company produced aircraft of its own design in the inter-War years, its renaissance in aircraft design dates from the Canberra. But on the production side it has been active since 1938. Thus, when English Electric began the development of its own aircraft immediately after the War the company already had extensive production facilities. Since then they have produced more than 500 Canberras and are now concerned mainly with the Lightning.

EARLY BIRD.—Although the companies which formed English Electric had produced aircraft in the 1914-18 War, the Kingston flying-boat was the first military aircraft of English Electric design.

On the missile side, the company set up new facilities at Luton and Stevenage after the War for its guided-weapons division, which was formed in 1949.

Reorganization

With the formation of English Electric Aviation the research, design and development activities of the English Electric aircraft and guided-weapons divisions have been brought under a single board. This has been done for a variety of reasons. Both divisions have their major customer, the Ministry of Supply, in common. Both work on weapons-system concepts, and the techniques involved in guided weapons and manned aircraft are now converging. With the development of the Lightning and the Thunderbird the divisions have been developing parallel and inter-related weapons systems for air defence.

For these reasons, and as a matter of convenience, it was felt that the facilities and work of the two divisions should come under the control of a single body—the board of English Electric Aviation. It was also important that these facilities should come under integrated control for the development of the company's new aircraft and missile systems projects.

It should be made clear that only the aircraft and guided-weapons divisions have been merged to form English Electric Aviation. Other members of the English Electric Group which have aviation interests are unaffected and maintain their original status as direct subsidiaries of the English Electric Co., Ltd. Included in this category are Marconi's Wireless Telegraph Co., Ltd., and D. Napier and Son, Ltd., while the aircraft-equipment division remains a department of the parent company. These have kept their original status because they have a wide range of customers who in many cases are unconnected with aviation and in other cases are in direct competition with English Electric Aviation.

Line of Command

When English Electric Aviation was formed all the employees of the aircraft and guided-weapons divisions automatically became members of the new company. This has as its chairman and managing director Mr. H. G. Nelson, who is managing director of the parent company. Lord Caldecote, deputy managing director of English Electric Aviation, is responsible for day-to-day management of the company; he also assists

CLIMATIC TESTS.—In this test on a Thunderbird surface-to-air missile, the temperature is kept at −20°C. for 14 days. Environment tests of this sort are made at the English Electric Stevenage works.

WARTON DEVELOPMENT.—Lightning fighters based at Warton are regularly exceeding Mach 2 during development flights.

Mr. Nelson in all the aviation activities of the entire English Electric Group.

English Electric Aviation has two chief executives: Mr. F. W. Page, who is responsible for the aircraft division, and Sir Conrad Collier, whose responsibility is the guided-weapons division. Other executives on the aircraft side are Mr. R. F. Creasey, director of engineering, and Wg. Cdr. R. P. Beamont, manager of flight operations. Engineering aspects come under Mr. F. D. Crowe, chief engineer, and Mr. A. E. Ellison is the chief designer. Air Cdre. Strang Graham is head of the aircraft division's London office.

Under Sir Conrad Collier on the missile side are Mr. L. H. Bedford, director of engineering, Mr. A. T. Slator, divisional manager, Mr. G. R. Jefferson, chief engineer, and Mr. E. L. Beverley, commercial manager.

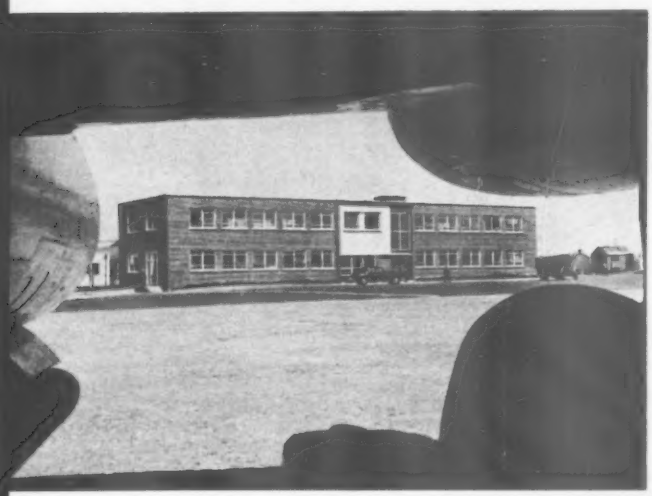
As mentioned earlier, production facilities are not owned by English Electric Aviation, but are under the direct control of the parent company. Aircraft production at Preston is controlled by Mr. T. O. Williams, who is responsible to Mr. W. Shorrock, the general manager there.

Activities

The main activities of the new company are, on the aircraft side, the development of the Lightning supersonic fighter for the R.A.F. and its variants such as the English Electric P.11 two-seat trainer which is expected to fly about the middle of this year. New projects include the "Canberra-replacement" TSR-2, to be developed by the company jointly with Vickers-Armstrongs (Aircraft), Ltd. Other work includes the study of all aspects of both supersonic and subsonic civil transports. The company may possibly enter the civil field either by building an established design under licence and developing it or by making a technical break-through in the supersonic transport field.

So far as missiles are concerned the major effort is on the Thunderbird surface-to-air missile system, which is now undergoing its acceptance trials for the Army. An advanced version of the Thunderbird is being developed and the company doubtless has other active missile projects. High-precision instruments and inertial-navigation systems for missiles, aircraft and ships are being developed by its instrument wing, and Minneapolis-Honeywell high-precision gyroscopes are being manufactured under licence for these systems.

The company's aircraft research and development facilities are at Warton aerodrome in Lancashire. The establishment there is fully equipped for all design, development and flight-test work. Its equipment includes a range of wind-tunnels



WARTON AT WORK.—Above, these offices at Warton aerodrome, framed by a Canberra, accommodate a staff of more than 60 people, including test pilots, who are directly concerned with the Lightning's day-to-day flying programme.

Right, a general view of the drawing office which is engaged on Lightning design work.

Below, in this school, personnel are trained in draughting techniques.

WEAPON TRIALS.—Firestreak air-to-air missiles form the major armament of the Lightning.

MISSILE REAR VIEW.—Below, this view of the Lightning emphasizes its large ventral fuel tank and shows how the Firestreak is mounted in a slightly nose-up attitude.

which can operate up to Mach 1.7; new tunnels will soon be opened for model-testing of aircraft and missiles up to Mach 6.

Equipment at Warton includes digital and analogue computers for data processing and extensive electronic, instrumentation and mechanical-test laboratories. The aerodrome runway is 3,000 yd. long and has approach lighting and ILS facilities. Surveillance radar is being installed so that aircraft can remain under full radar coverage during test flying.

Major aircraft assemblies are produced in the English Electric factories at Preston and Accrington and final assembly is at Salmesbury. Aircraft are flown from Salmesbury to Warton for development and test flying.

The missile development facilities of English Electric Aviation are at Stevenage and Luton. They include design offices and electronics, vibration and climatic-test laboratories, as well as engine-firing test beds. The buildings and facilities of the instrument wing are at Stevenage. Units are maintained at Aberporth and Woomera for launching trials.

Other companies in the Group have aviation facilities which can be used by English Electric Aviation. These include the Napier flight development establishment at Luton, the Bradford laboratories of the aircraft equipment division, the Marconi laboratories at Chelmsford and many other facilities throughout the Group.

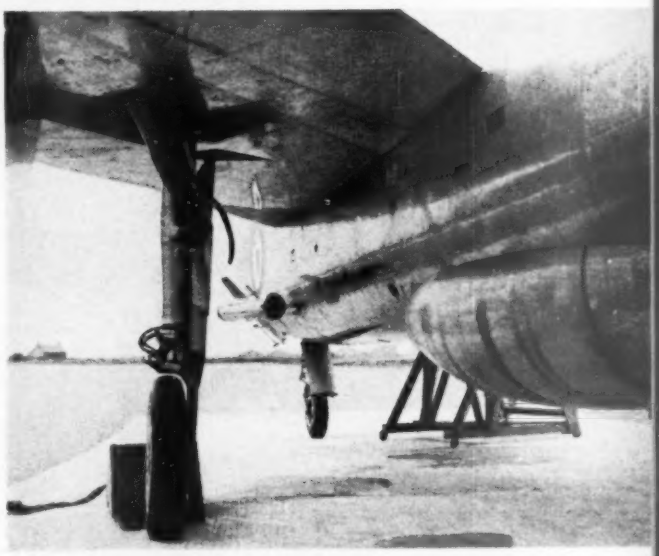
Clearly English Electric has a major stake in aviation; the company has no British rivals today in the development of supersonic interceptors. Although the English Electric Group has a range of interests in transport and power generation, transmission and utilization, its aviation activities must account for a substantial part of the Group's turnover. The recent regrouping of its activities to form English Electric Aviation shows that the Group intends to maintain and possibly expand its activities in the aircraft and missile fields in the years ahead.

An Historical Postscript

Although English Electric still tends to be thought of as a new name in the British aircraft industry, the company can lay claim to having built its first aeroplane in 1911. In the intervening 48 years, not far short of 6,000 aeroplanes have been built in English Electric factories.

The English Electric company itself did not come into existence until 1918, by the amalgamation of five engineering concerns—the Coventry Ordnance Works, the Phœnix Manufacturing Co. at Bradford, Dick Kerr and Co., Ltd., of Preston, Willans and Robinson, of Rugby, and Siemens Dynamo Works, of Stafford. Of these the first three had, by 1918, a considerable fund of aviation experience and were in production with aeroplanes; after the amalgamation the Phœnix design team was kept in existence as the aviation department of English Electric.

Of the constituent companies, Coventry Ordnance Works had the longest history of aircraft construction, having sponsored a biplane in 1911 to the designs of W. O. Manning. This 1911 C.O.W. biplane, with a 100-h.p. Gnôme engine, was tested at Brooklands by T. O. M. (now Sir Thomas) Sopwith, and was not unsuccessful. It, and another similar biplane with the highly unreliable 110-h.p. Chenu engine, were entered for the 1912 Military Trials on Salisbury Plain—but neither completed the necessary tests.

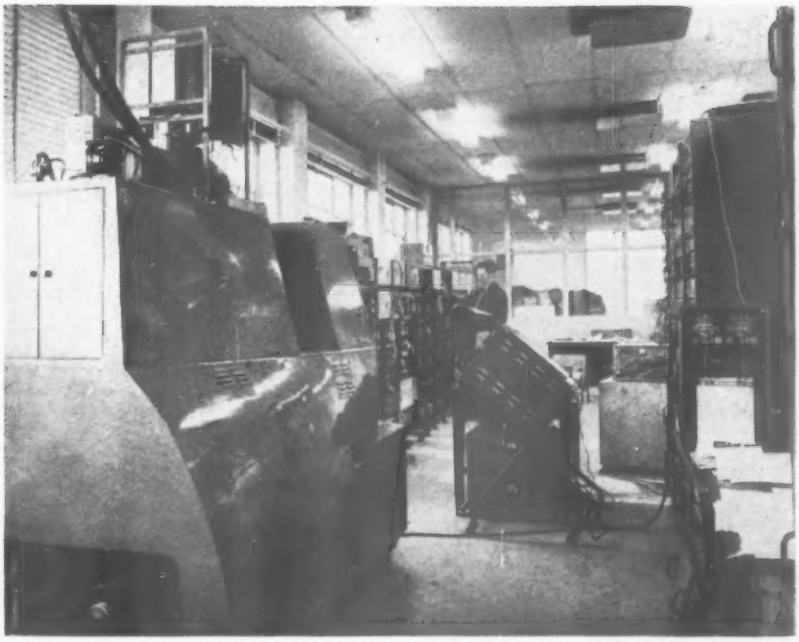


Nevertheless, it is not without interest that the earliest aeroplane that can be considered to be of English Electric ancestry was a military type—setting the pattern for the Group's almost exclusive interest in warplanes ever since. C.O.W. did not produce any more aeroplanes of original design, but went on to manufacture more than 700 aircraft to Royal Aircraft Factory designs up to the end of the War.

W. O. Manning, having joined the R.N.A.S. as a technical officer, reappeared in English Electric history early in the First World War, when he was released to take charge of aircraft design and development at Phœnix Dynamo Manufacturing Co. Phœnix—in the person of Mr. P. J. Pybus, managing director—had undertaken the production of aircraft to Admiralty contracts, starting with such types as Short seaplanes and bombers, Maurice Farman Longhorns and Fritz Koolhoven's quadruplane, the Armstrong Whitworth F.K. 10.

In 1917 Phœnix graduated to production of the F.3 and F.5 flying-boats originated by Lieut. Cdr. John Porte, and Manning designed the superstructure of a new boat, the Phœnix P.5 Cork, two of which were built on Linton Hope hulls constructed by May, Harden and May.

Flying-boats of the F.3 type were similarly the basis of Dick Kerr's stake in the aviation industry, 110 having been built by the time the company became part of English Electric. When the merger took place, both Phœnix and Dick Kerr were building prototypes of a big new flying-boat to Admiralty



FLIGHT SIMULATOR.—This flight simulator at Warton has been used by English Electric in both Canberra and Lightning development.

requirements. One of these eventually materialized as the Fairey Atalanta; construction of the other was abandoned after the end of the War.

With the cold wind of peace blowing through the deserted production shops, English Electric decided in 1919 to concentrate on flying-boat development in the belief that boats, by their ability to use natural alighting places, would provide the best means of commercial air transport. For the next seven years the company worked on a progression of military flying-boats—the Kingston, of conventional layout, and the interesting Ayr, with its lower wings providing planing stability at take-off.

One other product of interest at this period was the Wren—an ultra-light monoplane in which Manning, supported by Major Maurice E. A. Wright (who was testing the Kingston for the Air Ministry), sought to achieve the simplest possible aeroplane capable of lifting a man. It was tested by Wright on Lytham Sands in 1921 and two more were built for the Light Aeroplane Competition at Lympne in 1923, when one shared first place with W. S. Shackleton's A.N.E.C.

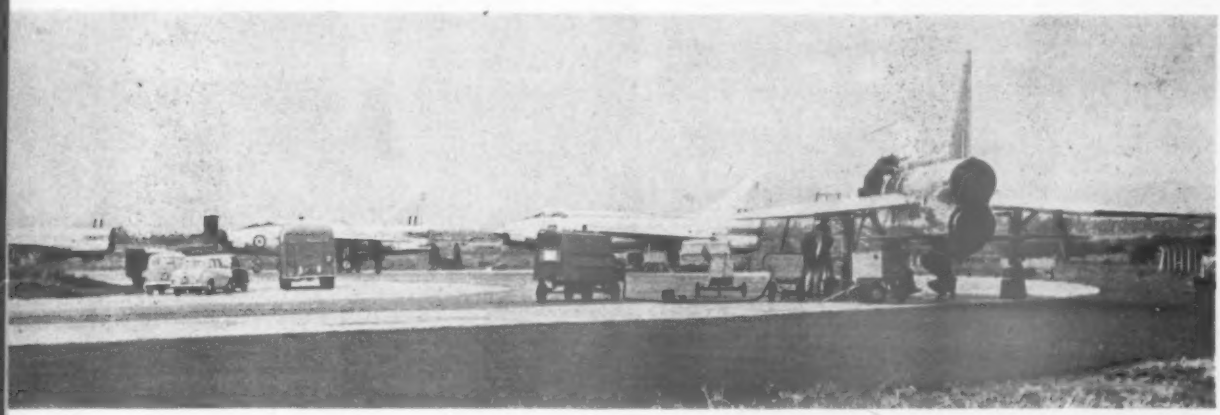
Although English Electric had foreseen the part to be played by flying-boats in the development of air transportation they did not succeed in gaining a share of the work. In March, 1926, therefore, the company announced the termination of aeronautical activities. What may have seemed at the time to be a final decision turned out to be no more than a 12-year pause, however, for in 1938, the company was once again asked to participate in the rearmament programme.

On December 21, 1938, an initial contract was placed for 75 Handley Page Hampden twin-engined bombers, and a production line was put down at the old Dick Kerr works in Preston. Little more than a year later, on February 22, 1940, the first Hampden was delivered; 75 were delivered in five months and by March 15, 1942, 770 had been built.

The Halifax followed the Hampden into production, and between August 15, 1941, and the end of 1945, 2,145 of these four-engined bombers and transports were built by English Electric. Then came the Vampire, for which the company was asked to take sole production responsibility in February, 1945, after de Havilland had built three prototypes. Production continued until 1950, and the company built 1,369 of various marks for the R.A.F. and R.N. and for export.

A design office was established at Preston in 1939 to look after local modifications on the Hampden and Halifax, and there, eventually, W. E. W. Petter took charge of the team which produced, with official backing, the Canberra. The success which attended this elegant twin-Avon medium bomber is now a matter of history. It has been in production continuously for the past 10 years and in that time has been built in four factories in Britain, one in the U.S.A. and one in Australia. Well over 1,200 have been built and the type has been adopted for service with the air forces of nine nations.

Compounded upon the Canberra's success is that of the Lightning—heralded as the R.A.F.'s last manned interceptor, and sure of a long and successful operational life.



LIGHTNINGS ABUNDANT.—The intensity of the development effort at Warton is shown by this view of four Lightnings being prepared for test flights.

The Fighting Services

A Message from Her Majesty

MARCH 19 was the 10th anniversary of the establishment of Princess Mary's R.A.F. Nursing Service and the Women's Royal Air Force as an integral part of the Royal Air Force, and to celebrate the occasion Her Majesty The Queen sent a congratulatory message to the Air Minister.

In this message The Queen referred to the just reward of the two Services in being accepted as full members of the R.A.F., and the magnificent way in which they had performed their many and varied duties over a long period in peace and war. Particularly as members of her family are closely linked with the two Services was she happy to value the enthusiasm, spirit and devotion to duty, and conveyed her sincere congratulations to the Services in reaching this milestone in their history.

A reception at St. James's Palace was attended by Queen Elizabeth The Queen Mother, Commandant-in-Chief of the W.R.A.F., and the Duchess of Gloucester, who is Air Chief Commandant of the W.R.A.F. Through an indisposition The Princess Royal, Air Chief Commandant of P.M.R.A.F.N.S., was regrettably unable to be present. More than 600 officers of the two Services attended.

Others who paid tribute to the importance, progress and endeavour of the women's Services were The Rt. Hon. George Ward, Secretary of State for Air; Air Commandant Dame Henrietta Barnett, Director, W.R.A.F., and Air Commandant Dame Alice Mary Williamson, Matron - in - Chief, P.M.R.A.F.N.S.

Graduation Parade

ABOUT 140 aircraft apprentices of the 83rd Entry took part in the graduation parade at R.A.F. Halton on March 25, reviewed by Mr. G. R. Laking, acting High Commissioner for New Zealand. This entry includes apprentices from New Zealand and Rhodesia.

The Queen's Colour was paraded and three squadrons of aircraft apprentices, a military band and a pipe and fife band took part.

The Quinton Trophy was presented to App./L. A. Cairns, the best ex-A.T.C. cadet on this course. It was subscribed for by the Air Training Corps to commemorate the gallantry of Flt. Lt. J. A. Quinton, G.C., D.F.C., who gave his life in saving an A.T.C. cadet who was a passenger in the same aircraft after a mid-air collision. It was presented to the R.A.F. six years ago.

Leeds Squadron's Dinner

SPEAKING at the Leeds University Air Squadron's annual dinner held recently, Air Chief Marshal Sir Walter L. Dawson, K.C.B., C.B.E., D.S.O., Member of the Air Council for Supply and Organisation, congratulated the Squadron on its accident-free year. R.A.F. accident totals were being lowered, he said, and everyone wanted the trend to continue.

The R.A.F. was looking to the Universities to provide many of the aircrews it would need in the future. There was no doubt that there would be a requirement for aircrews up to 1970, and probably well beyond then.

Air Chief Marshal Dawson presented the Casson Cup, awarded to the best all-round member of the Squadron, to Acting Plt. Off. J. H. Piercy, who is doing textile research at Leeds University. He has been a member of the Squadron for three years.

Standard for Sunderland Unit

THE only R.A.F. unit still flying the Short Sunderland flying-boat—No. 205 Squadron (Wg. Cdr. R. A. N. McCready), based at Changi, Singapore—was due to receive its squadron standard on March 20. Although its main operational equipment is the Avro Shackleton this Squadron still has two Sunderlands on strength.

This Squadron has had a long association with Singapore, being based there from 1930 until the evacuation of Malaya in 1942, and it returned to Singapore at the end of the Second World War. It was originally formed in 1916 as No. 5 Squadron, R.N.A.S., and adopted its present title on the amalgamation of the R.F.C. and R.N.A.S. as the R.A.F. in 1918.

Since 1945 various rôles have been undertaken by the Squadron, including patrols during the Korean War, sorties against terrorists in Malaya, and anti-piracy and anti-smuggling operations.

The presentation of the standard was to be made by Air Marshal Sir Alick Stevens, K.B.E., C.B., R.A.F.(Retd.), who was A.O.C.-in-C., Coastal Command, from 1951 to 1953, and who commanded No. 205 Squadron in 1936.

R.A.F. Appointments

THE following are among recent Royal Air Force appointments:—

Air Ministry: Wg. Cdr. I. G. Broom, D.S.O., D.F.C., A.F.C., to the Department of the Air Member for Personnel; Sqn. Ldr. A. Mills and Sqn. Ldr. E. L. Macro to the Department of the Air Member for Supply and Organisation, with acting rank of Wing Commander.

Fighter Command: Gp. Capt. W. M. Lyons to Headquarters as Command Accountant; Wg. Cdr. C. F. Bradley, D.S.C., to R.A.F. Old Sarum, to Command; Sqn. Ldr. C. G. Lewis to R.A.F. Boulmer, for operations duties, with acting rank of Wg. Cdr.

Bomber Command: Wg. Cdr. G. D. Cooper, M.B.E., to R.A.F. Coningsby, as Senior Technical Officer; Wg. Cdr. P. Reynolds, D.F.C., to R.A.F. Binbrook to command No. 12 Sqn.; Sqn. Ldr. S. S. Dobbs to R.A.F. Cottesmore, as Senior Technical Officer, with acting rank of Wg. Cdr.; Sqn. Ldr. R. E. Dyson, D.F.C., to R.A.F. Alconbury to command, with acting rank of Wg. Cdr.

Coastal Command: Sqn. Ldr. M. G. Fountain to R.A.F. Ballykelly, as Senior Technical Officer, with acting rank of Wg. Cdr.

Flying Training Command: Wg. Cdr. A. H. Burton, D.S.O., D.F.C., to R.A.F. Hornchurch as Deputy Commandant, Aircrew Selection Centre; Sqn. Ldr. R. W. Mathers, D.F.C., to Headquarters as Command Flight Safety Officer, with acting rank of Wg. Cdr.

Technical Training Command: Wg. Cdr. R. E. R. Adams to R.A.F. Bircham Newton, as Chief Instructor, Officers' Advanced Training School.

Maintenance Command: Gp. Capt. A. B. Holloway, C.B.E., to Headquarters, No. 40 Group, for operations duties.

Far East Air Force: Sqn. Ldr. I. Thomas, D.F.C., to R.A.F. Staging Post, Katunayake, Ceylon, to command, with acting rank of Wg. Cdr.

Miscellaneous: Wg. Cdr. B. R. M. Wade, D.F.C., to Headquarters, Western Army Command, as Liaison Officer.

Reunion

No. 60 Squadron.—An officers' reunion is to be held at the R.A.F. Club, Piccadilly, London, W.1, at 19.00 hrs. on May 8. Tickets cost 13s. 6d. each and are obtainable from Wg. Cdr. C. Howells, Air Ministry, Room 645, Horseferry House, Horseferry Road, London, S.W.1.

Guests at Leeds University Air Squadron's dinner referred to alongside included Air Chief Marshal Sir Walter L. Dawson, Air Member for Supply and Organisation (extreme right), and (left to right), Brig. J. Noel Tetley, Pro-Chancellor, Leeds University; Maj.-Gen. J. C. Latter, member of the University Military Education Committee, and Sqn. Ldr. A. V. E. Palmer, commanding the Squadron.

Memories of Brancker

TO your old "Polygon," who was a Flight Commander in France in 1917, Mr. Collier's book* brings back many nostalgic memories. Memories of the time before 1914 when youth and lack of pence confined my interest in aviation to reading THE AEROPLANE from cover to cover, and to making vast numbers of model aeroplanes. Memories of the war in the air in 1917-18 and its appalling casualty rate and certain even more appalling staff officers. Memories of London in 1917, the Savoy bar and the wonderful shows; and last but not least, memories of that golden age between 1920 and 1930 when flying was fun.

Mr. Collier has produced an excellent character study of the lovable, enthusiastic, companionable man who ended his life in the R.101 disaster, and he can turn a pretty phrase, e.g., "a small shortlegged man who looked like a well-bred but dissipated Sealyham which had borrowed his master's eyeglass" and "unlikely to confine his social talents to a narrow compass," which described the opinion of Brancker's brother officers when he suddenly got married. I always thought myself that Brancker should have been a fighter pilot, for he had all the attributes. He had an agile mind and he loved women and wine, flying and fun. Indeed all life was fun to Brancker.

But this book gives us far more than a study of one man's character. It is quite a brilliant and, as far as I know, factual study of the personalities and politics of the Government and of the Services which formed and built up the air power of England. Politicians such as Lloyd George and Lord Derby, Lord Rothermere and Pemberton Billing appear with Service people like Kitchener and Haig, Sykes and Henderson, Salmond and Trenchard.

Mr. Collier gives us a graphic picture of the squabbles and petty jealousies, the constant sackings and replacements of senior officers which went on in Whitehall and Westminster, and the abysmal ignorance of those at home and abroad who directed the fighting men in France. London wined and dined gaily while men died in the mud of the Somme and were shot down over the fields of Flanders.

Even young lads like myself in 1917, leading my flight of fighters, sometimes wondered what good we were doing patrolling at 15,000 ft. backwards and forwards 10 miles behind the German lines, while Richthofen and his boys climbed up above us and chose their moment to come down and kill. It was, perhaps, just as well that we could not see behind the scenes.

Like myself at that time, the author does not admire Trenchard's conduct of the air war in France, and considered him "inarticulate, unimaginative, barely literate" but gives full credit to his unshakable determination and force of character. He gives Brancker rather than Trenchard the credit for winning the great inter-Service battle after the War, which kept the R.A.F. in being. This is not correct for it was the rock-like determination of "Boom" which won the day against the power of the admirals, generals and politicians. Had that peacetime battle been lost we should have lost the Battle of Britain and the Hitler War.

But generally I think Mr. Collier does give a very true picture of those who played the major parts in establishing the Air Force between 1914 and 1922 and those who started up civil aviation after the War. And there is no doubt that Brancker played a very great part both in war and peace despite his playboy tendencies.

The first part of the book going up to the end of the Kaiser War, is not only interesting to people like myself, who knew Brancker personally, but also of considerable value to anyone interested in the history of the R.A.F. in its formative years. The chapters devoted to civil aviation and the events leading up to the final disaster of the R.101 are also good, although, of course, the latter is dealt with far better and in much more detail in Mr. Shute's book, "Slide Rule."

For some obscure reason the author devotes no less than five chapters to the affairs of Miss Douglas-Pennant. Admittedly, at the time the Douglas-Pennant affair gave much copy to the Press and indeed caused a lot of worry to certain politicians but, after all, Brancker was only the instrument who gave the sack, somewhat tactlessly perhaps, to that unfortunate but well-meaning lady who had issued the rather peculiar instruction to the girls of the Women's Royal Air Force that "ladies must sleep in their own beds."

It was, in my opinion, quite a minor episode in a great man's career, and certainly does not deserve such a lengthy and detailed account. Indeed when I asked my wife, who was a personal friend of Brancker in 1927, what she thought about Brancker and the Douglas-Pennant case, she could barely recall anything about it.

Another minor criticism of an excellent book concerns the author's annoying habit of missing out the year when quoting dates. He says "Then in December Brancker. . . ." and the reader may have to go back many pages to find out whether it is December, 1917, or December, 1916.

This book may be caviare to the General but is much more than the usual hero worshipper's account of a great man's life. It should be read by all interested in the creation of the Royal Air Force and the build-up of civil aviation.—POLYGON.

* Heavenly Adventurer, by Basil Collier. 236 pp., 5½ in. by 8½ in. Illustrated. Martin Secker and Warburg, Ltd. Price 25s.

Award for Achievement

FROM the City and Guilds of London Institute comes the news that an Insignia Award has been specially conferred on Air Cdre. F. R. Banks, C.B., O.B.E., Hon. F.A.I.S., F.R.Ae.S., M.I.Mech.E., F.Inst.Pet. The award has been made in recognition of his outstanding achievements and contributions in the field of aero-engine research and development.

The City and Guilds Insignia Award in Technology was established in 1952, and is intended to mark the achievement of those in industry whose training has been based purely on practical experience supplemented by theoretical study. Each year up to five of these special awards are made by the Council of the Institute to cover the chemical, metallurgical, constructional, electrical, mechanical and textile industries. They are granted "to persons of distinction in recognition of their outstanding achievements in technology and are intended to encourage younger men gaining the Award in the usual way." This normal procedure is by thesis and interview.

Air Cdre. Banks needs no introduction to regular readers of THE AEROPLANE. He has been a director of the Bristol Aeroplane Company since 1954 and was recently appointed sales director of the new Bristol Siddeley Engine Co., Ltd.

Born in 1894, he was educated at Christ's College, Finchley, and was apprenticed to the East Anglian Ice and Cold Storage company of Lowestoft. He curtailed his training to join the Royal Navy in 1914 and was commissioned in the R.N.V.R. in 1916. After the War he specialized in marine diesel engines and became chief experimental engineer to Peter Hooker, Ltd.—the British Gnôme and Le Rhône company. Subsequently he joined the technical department of the Anglo-American Oil Co. as a specialist in aero-engines. Later he became technical manager of the Associated Ethyl Co.

During the Second World War, Air Cdre. Banks joined the R.A.F.V.R. and was seconded to M.A.P. where he later became director-general of engine research and development. After the War he rejoined Associated Ethyl as technical manager and chief engineer until 1952 when he went to the M.o.S. "on loan" as principal director of engine research and development. He returned to his company in 1953 and joined Bristols in 1954.

According to the citation for the Award, published by the City and Guilds Institute: "Air Commodore Banks is self-trained. Since he was unable to build upon the foundations of a full-time technological education, his achievements are all the more praiseworthy. His abounding enthusiasm and resourcefulness have earned him great credit during a long and distinguished career."

Seeking Fresh Fields

LAST week came an announcement of the resignation of Mr. M. J. Brennan, B.Sc., M.I.Mech.E., F.R.Ae.S., from his post as chief designer at Saunders-Roe, Ltd. Although this was unexpected news, and followed closely on another resignation from the technical executive of the company (see elsewhere in this issue), there was no connection at all between the events.

Maurice Brennan, one of the industry's more dynamic and stimulating personalities, has never made any secret of his disappointment that plans for the S-R. 53 mixed-powerplant research aircraft were not pursued in official quarters to the extent that he thought they should have been; or that likewise, developments of Black Knight were not more actively instituted. But these were not the reasons for his move, he tells us. He is leaving the company simply to seek wider and further scope for his talents and energies and intends to stay in the aircraft industry.

Born in 1913, he was educated at Glasgow University where he obtained his degree. Leaving Glasgow he joined the Hawker Aircraft company in 1934. Three years later he left Hawkers to join Saunders-Roe, with whom he has been ever since.

U.S. Military VTOL and STOL Developments

AN outstanding feature of American research and development work connected with VTOL and STOL aircraft is the extraordinarily wide variety of types that are being investigated. These were surveyed recently in a paper in the Journal of the American Helicopter Society which dealt with the Department of Defense contribution to this effort. The authors, C. F. Horton, Aircraft Weapons Systems Division, and Lt.-Col. J. L. Klingenhagen, Army Staff Officer, in the Office of the Assistant Secretary of Defense (Research and Engineering) concentrated on VTOL/STOL developments of the past eight years involving rotors, propellers, ducted fans and turbojets. They have not covered the helicopter research and development programme nor have they dealt with rocket craft and lighter-than-air VTOL systems which may be under consideration.

In addition to the VTOL flight research aircraft programme, they point out, there has been continuing study to evolve new VTOL concepts. One such example is the augmentation of the vertical thrust of the powerplant by means of the ground-proximity effect.

Recent NASA research has shown that significant augmentation of the thrust from an annular jet nozzle is obtained when the nozzle is placed in close proximity to the ground, the augmentation of the annular jet being compared with that of a propeller, direct jet and ducted fan in a flat plate. The major advantage arising from this principle would be its very low power requirements if the vehicle were allowed to remain close to the surface; it is also possible to conceive its application to an overwater transport.

It should, perhaps, be recorded here that similar investigations have been done in this country and have shown some promising results. Indeed, it is an open secret that Saunders-Roe are closely associated with a project of this sort.

More than $100m. has been put into the development of VTOL flight research aircraft effort during the 1950-1958 period, not including helicopter or pure STOL configurations. In order to present this VTOL research programme systematically, the VTOL configurations have been classified by the authors on the basis of the propulsive means used for hovering and low-speed flight—rotor, propeller, ducted fan and turbojet types. Also, the configurations have been classified on the basis of their means of accomplishing the transition from hovering to forward flight. These are shown in the accompanying tables.

Thrust-redirection configurations are those having a single means of propulsion, with provision for either tilting the thrust unit itself or deflecting the slipstream or jet exhaust to perform the transition; the fuselage remaining essentially horizontal at all times. Aircraft tilting configurations are those in which the thrust axis remains essentially fixed in the aircraft and the aircraft itself tilts to perform the transition from hovering to forward flight. These are further divided into tail-sitter aeroplane, flying platform and aerial jeep—the two last-named being included inasmuch as a nose-down attitude is required for forward flight.

The authors report that there are a total of 24 possible VTOL aircraft types, 18 of which have been the subject of research in the United States. Greatest effort by the Department of Defense has been put into tilting-aircraft configurations and the smallest amount into dual propulsion. More than one Military Service has participated in more than 50% of the new VTOL projects in the past three years—which suggests a high degree of co-operation.

MAJOR VTOL PROJECTS 1950-1958

	Rotor	Propeller	Ducted Fan	Turbojet	Total	R & D Effort
Dual Propulsion ..	2-DoD NASA Foreign		1-DoD NASA Foreign	NASA Foreign	3-DoD	3-DoD
Thrust Redirection ..	4-DoD NASA Foreign	4-DoD NASA Foreign	6-DoD NASA	5-DoD NASA Foreign	19-DoD	2-DoD
Aircraft Tilting ..	1-DoD	3-DoD NASA	5-DoD Foreign	1-DoD NASA Foreign	10-DoD	1-DoD
Total	7-DoD	7-DoD	12-DoD	6-DoD	32-DoD	

DoD=Department of Defense. NASA=National Aeronautics and Space Administration (Formerly NACA)

Military VTOL/STOL Research Aircraft Projects 1950-1958

Principle of Operation	Rotor	Propeller	Ducted Fan	Turbojet
Dual Propulsion ..	McDonnell XV-1 (AF-A)*	—	—	—
Thrust Tilting ..	Bell XV-3 (AF-A) Transcendental (AF-A)	Vertol VZ-2 (N-A) Hiller X-18 (AF)	Doak 16 (A) VZ-4	—
Thrust Deflection ..	Kaman K-16 (N)	Ryan 92 (N-A) VZ-3 Fairchild M-224 (A) VZ-5	Piasecki Ring-wing (N) Collins Aerodyne (N-A)	Bell X-14 (AF)
Tail Sitter	—	Convair XFY-1 (N) Lockheed XV-1 (N)	—	Ryan X-13 (AF)
Flying Platform ..	DeLackner "Aerocycle" (A)	—	Hiller VZ-1E (N-A)	—
Aerial Jeep	—	—	Aerophysics VZ-7AP(A) Chrysler VZ-6 (A) Piasecki VZ-8P (A)	—

* A—Army AF—Air Force N—Navy

One of the many VTOL/STOL projects currently being studied in the United States is this Vertol six-propeller tilt-wing aircraft. This scale model is now undergoing wind-tunnel tests at the NASA's Langley Research Center.

Flying the Piaggio 166

By John Fricker

HAVING produced, in the Vespa motor-scooter, one of the most popular personal vehicles in the World, Piaggio may justly claim to be experts in the field of light transport. Although in terms of numbers, the same popularity is hardly likely to be attained by the products of the aviation division of the company, its latest design has a most promising potential for executive flying.

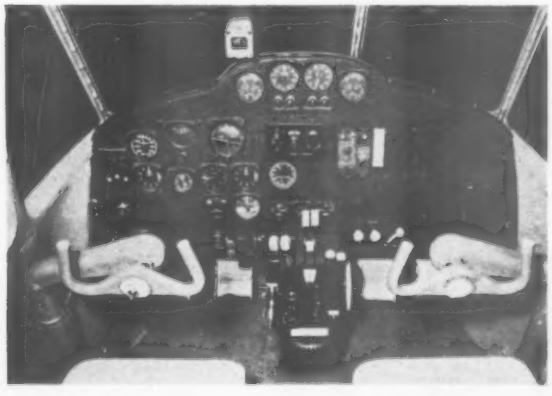
Since the first flight of the prototype on November 26, 1957, the Piaggio P.166 has progressed well past the point of its type certification by both the Italian and American authorities, towards the imminent delivery of a production aeroplane to its first commercial customer. The fact that this is a British company is a gratifying indication of the expansion of executive flying in this country. It is also a tribute to this Italian design that it has been chosen by so experienced an executive operator as MacAlpines in preference to any of the numerous American aircraft in a comparable weight category.

These are now fairly easily available for import into the U.K., but the P.166 still has an advantage in being obtainable for sterling. It also has more tangible virtues, such as the comprehensive nature of its equipment and furnishings compared with equivalently priced American machines, and approximately twice the cabin volume of its most similar competitor. Add to these an outstanding take-off and landing performance, and the confidence with which Piaggio are planning to enter the highly competitive executive market within the United States itself becomes understandable.

The P.166 is, of course, a landplane development of the all-metal P.136 amphibian, which I flew with considerable enjoyment last year (THE AEROPLANE, April 4, 1958). A similar wing and pusher powerplant installation has been retained, with great advantages in cost and comfort, but these components are mounted on a new and very capacious fuselage, with accommodation for up to eight occupants.

About 40 P.136s were marketed in the U.S. as the Royal Gull by the Trecker Aircraft Corporation, having been shipped from Italy as complete airframes, except for instruments, radio, engines, airscrews and external finish. They were then assembled and completed to customers' requirements with American equipment for a remarkably low cost.

A similar arrangement is being made with the Trecker company for the P.166. The second prototype, I-RAIF, was flown to its Milwaukee plant after being shipped across the Atlantic, for C.A.A. certification, and is now undergoing demonstration and sales flights. A further 12 complete airframes will follow at the rate of one per month, for powerplant installation, furnishing and painting by Trecker, and another batch of 10 P.166s for general sale will then be embarked upon by Piaggio.



The prototype P.166 has a very simple cockpit layout, with a single set of flight instruments, American VHF and radio compass equipment and an autopilot.

An unusual view of the P.166 which displays the wing and powerplant installation derived from the amphibious P.136.

For a U.S. sales price in the region of $80,000, the Trecker P.166 will include such features as full internal chromate protection, swivel seats, a toilet, curtains and external finish, which in its nearest American competitor are all extra items. Also included will be a rotating anti-collision beacon which, although now mandatory for all aircraft with an American transport C. of A., is not included in the basic price of most contemporary executive types. Despite shipping and import costs the P.166 is therefore likely to prove a bargain in the American executive market.

For this specialized type of travel comfort is particularly important, since time spent in the air will normally be used for routine work and occasional conferences. The first impression of an outstanding degree of space on entering through the rear port door into the cabin of the P.166 is therefore important. For all except a six-footer it is possible to stand upright throughout most of the length of the cabin, which contains six comfortably upholstered seats.

Four of these, for the passengers, can be swivelled round for conference purposes, in addition to having adjustable backs and sliding seats. Lightweight tables are stowed in side pockets on the cabin walls and two more seat squabs can be clipped into place in the central aisle to increase available accommodation to a total of eight passengers. At the rear of the cabin, in the main bulkhead carrying the wing mainspar pick-up attachments, is a door giving access to a compartment which has a toilet cubicle on one side, a small galley or bar on the other, and space for light baggage to the rear. Main baggage space is a full-width hold with an external access door, aft of the centre fuselage. Individual lighting, ventilation and heating points are provided for each passenger, together with oxygen outlets, if required.

Access to the front cabin by the crew may be gained by an additional door on the starboard side of the nose. Working space in the cockpit is as adequate as in the cabin, the high roof line continuing well forward of the pilots. The extraordinarily good view through the deep windscreen panels and the very large side windows is obstructed only directly forwards by the slightly high front coaming.

The de-luxe atmosphere of the raised flight deck is heightened by the upholstered arm rests on the cabin walls. Full dual control is provided as standard, with a central console for throttle, pitch, mixture, trim, flap and undercarriage controls, as in the P.136. In the prototype, flight instruments are grouped only in front of the left-hand seat, in a very simple layout, with engine gauges above the centre of the panel, and radio compass and VHF selectors below them. At the bottom of the left-hand panel is the control box for the American FTR autopilot. Neatly housed on a large roof panel are various fuel and engine switches; gauges for the four wing and tip tanks (total, 193.6 Imp. gal.), and temperature gauges and voltmeters.

The contribution to comfort conferred by the pusher installation of the geared and supercharged Lycoming GSO-480-B1C6 flat-six engines, which produce 340 b.h.p. each for take-off, became apparent when starting up at Villanova d'Albenga, under the guidance of Commandante Aldo Gasperi, Piaggio's volatile chief test pilot. The Lycomings came to life with a distant rumble, and a noticeable absence of the airscrew noise which normally accounts for much of the total volume of decibels in the cabin.

Once the Goodyear disc brakes have been released by the

The P.166 has the roomiest cabin and largest window area of any aircraft in its class. The inner armrests of the passenger seats fold down to carry two additional persons if required.

slightly inaccessible parking lever below the starboard panel, there is little need to touch them when taxi-ing, until it is necessary to stop. Very gentle pressure on the toe pedals will then achieve the desired result, the hydraulic brakes being both sensitive and powerful. Normal technique on the ground is to manœuvre the P.166 (which, despite its fuselage-stowed undercarriage, corners like a Grand Prix racing car) by its steerable nosewheel through the medium of the rudder pedals.

These turn the nosewheel through half the angle of rudder displacement, but for very tight turns on the ground the control yoke may be pushed fully forward to depress a plunger on the port cockpit wall. This action frees the nosewheel to castor, and differential braking will turn the P.166 in almost its own length. Steering action is automatically restored as the nosewheel becomes centralized.

Before trying the P.166 for myself I was given a spirited demonstration of its handling by the Commandante. Racing on to the runway with the aid of the nosewheel steering, he continued to take-off without touching the control wheel until about 75 m.p.h. showed on the A.S.I. He then grabbed the wheel long enough to launch the P.166 into the air like a rocket with a single grandiose heave before taking both hands and feet off the flying controls for the climb-out.

This he rapidly trimmed into a very steep angle at about 120 m.p.h., after dumping take-off flap, and the V.S.I. indicated a rate of climb of about 2,000 ft./min. Reducing power to the normal cruising setting, he then levelled out and hoicked the P.166 into a fantastic feet-off Rate 4 turn in each direction. Returning briefly to level flight, still with feet off the rudder pedals, he opened up the port engine to full power and throttled back the starboard, holding the resultant yaw purely on the ailerons.

After feathering the starboard engine he made a steep turn in the same direction, allowing it to continue for some time, hands and feet off, before reversing bank with the ailerons for a maximum-rate turn to port. Further demonstrations, after restarting the feathered powerplant, included steep turns and recoveries on a rudder alone, and culminated in a full-throttle dive up to the limit speed of 230 m.p.h., to within inches of the grass at Villanova. Pulling up to miss the hangars the Commandante climbed almost vertically into a semi-stalled turn at 1,400 ft., during which the undercarriage was extended, and a landing made from the ensuing glide.

It was, as they say, a convincing demonstration. I did not need to be further convinced that Gasperi has rolled the P.166, letting the nose drop slightly when inverted to minimize negative *g* and keep well within the normal civil-load factors of −1.5 and +3.5 *g*. As I found, however, when I moved into the left-hand seat, the P.166 controls invite that sort of handling, and it is easy as well as extremely pleasant to fly.

Take-off is made with 15° of flap if required, set via an infinitely variable hydraulic control lever on the centre console, with an indicator dial on the port panel. All three trims can be set more or less to neutral, although slight aft rotation of the elevator wheel assists in maintaining the steep climb.

The latter is very necessary at Villanova d'Albenga, which is a mile or so inland from the seaboard of the Italian Riviera and surrounded in close proximity by the sizeable foothills of the Ligurian Alps. It has been the flight centre of the Piaggio company for many years, although several miles away from the aircraft plant at Finale Ligure, and its encircling hills, broken only by a valley leading on to the runway from the sea, probably have much to do with the invariably good take-off and landing performance of Piaggio designs.

During my recent visit the wind was blowing from the sea down the 1,200-yd. runway and on opening the throttles little effort was needed to keep the P.166 straight by gentle rudder-pedal movement. With three persons on board and nearly full fuel, acceleration was very rapid at the gated sea-level power of 45-in. Hg. and 3,400 r.p.m. This may be increased to 48-in. Hg. if required, for maximum performance, and the take-off power of 340 s.h.p. can be maintained up to 7,900 ft.

The Commandante judges the unstick point purely by feel, but, lacking his expertize, I applied gentle back pressure to the control column at about 60-65 m.p.h., and the P.166 flew itself off some 10 m.p.h. later after a run of only a couple of hundred yards. Normal technique is to hold the aircraft on the ground until the safety speed (92 m.p.h. at 7,720-lb. max. weight) is achieved, and then climb away initially at that speed. The sea-level run at I.S.A. +15° C. is then only about 1,200 ft.

On retracting the undercarriage, which swings straight up hydraulically, with the mainwheels housed edge-on in the fuselage and partly in the wing roots, there is a slight yaw, but very little longitudinal trim change. Flap can also be raised

Points of interest in this photograph of the prototype P.166 include the low-slung cabin, rear baggage compartment with 300 lb. capacity, and superb surface finish.

With typical Italian elegance, the P.166 displays its shapely lines over the Ligurian Alps. The second prototype is fitted in this photograph with a trailing pitot for position-error assessment.

with little effect, and power reduced to about 3,000 r.p.m. and 42-in. Hg. for an impressive 1,500 ft./min. en-route climb at 120 m.p.h. Apart from the normal 5-min. limitation for full power there are no restrictions resulting from cooling of the pusher-mounted Lycoming engines, which have been flight tested in continuous climbs at maximum permissible power to 27,800 ft. on several occasions.

With its supercharged powerplants, the P.166 has an optimum cruising altitude of nearly 15,000 ft. where, at the economy setting of 65% power (2,600 r.p.m.), it will return a true airspeed of about 203 m.p.h. For prolonged operation at this height the use of oxygen is, of course, advisable, and is available in the P.166 if required. Many customers, however, will no doubt accept the slight loss in cruising speed and increased fuel consumption resulting from an operating ceiling of, say, 10,000 ft., in return for dispensing with oxygen masks.

The ideal solution would naturally be the provision of a pressure cabin, but the installation of such a facility in an aeroplane the size of the P.166 would leave it with little or no useful load, and would also be almost prohibitive in cost. Apart from its being always available if required, and used regularly by certain operators, the high-altitude potential of the P.166 is likely to be most useful in maintaining the excellent take-off performance on airstrips at formidable elevations and with high ambient temperatures, of which there are many throughout the World.

As we headed out over the towers of Albenga towards a cold blue Mediterranean, I throttled back to a low-altitude cruise setting of about 35-in. Hg. and 2,700 r.p.m. (75% power), giving about 160 m.p.h. I.A.S. and a consumption of some 18 Imp. gal./hr. per engine. This would come down to about 14 gal./hr. for economical cruising at 10,000 ft.

In cruising flight the P.166 handled extremely well, with pleasantly harmonized controls allied to excellent stability characteristics. The rudder proved light and sensitive, requiring small angles of deflection for most conditions of flight, and directional stability, from the large fin area, was very positive. Elevator forces were moderate throughout the speed range, and the longitudinal stability at our C.G. just about positive.

The ailerons of the P.166—all-metal, like the rest of the aircraft—struck me as being particularly pleasant. These are controls for the lazy pilot—just lean one's weight on one side of the control yoke and the P.166 obligingly turns in the desired direction, maintaining the selected angle of bank with neutral lateral stability. The overall impression of P.166 handling is that the controls demand little physical effort, with the aid of positive and accurate trimmers, to place the aeroplane in the desired attitude, where its stability tends to keep it regardless of external disturbances.

Being slotted the ailerons retain much of their effectiveness down to the stall, which clean and power off comes after a great effort to get the control wheel fully back, and with little warning at about 70-75 m.p.h. Recovery appears to be instant on lowering the nose, with very little loss of height. For the "all-down" stall, the undercarriage was lowered after reducing speed to 140 m.p.h., and the full 45° of slotted flap extended.

With a trickle of power the rate of descent, trimmed to about 105 m.p.h., was nearly 2,000 ft./min. in this configuration and the stall breakaway came at about 60-65 m.p.h. I.A.S., again with little preliminary buffet. The nose dropped quite gently and the wings could be kept level by coarse use of aileron. Like most modern aircraft the P.166 has an artificial stall-warning system, with an indicator horn, which did not appear to be operative in the prototype.

Aileron effectiveness at low speeds is also assisted by the end-plate effect of the 50-gal. tip tanks, which are removable if not required. They impose only a 1-m.p.h. penalty, however, on the maximum speed, and virtually double the internal fuel capacity. Their installation required a 35-cm. extension on the original P.136 wing, which was otherwise unchanged for the P.166. Another convenient feature of this development process is that the Royal Gull-type Goodrich de-icing boots may be fitted to the wings and tail of the P.166.

Throttling back one engine from the cruise resulted in a moderate foot load, which required about half the rudder-trim range to cancel out, until the propeller was brought into the feathering range, when 5° of trim sufficed. At the moment the prototype has American Hartzell propellers, which will be fitted to all Trecker-assembled P.166s, but Piaggio's own three-bladed airscrew, developed for the P.136-L2, will be installed for European sales when its certification is completed.

Full throttle and 3,100 r.p.m. on the live engine gave an asymmetric cruise of about 140 m.p.h. or a climb at 115 m.p.h. of some 600 ft./min. Handling on one was completely straightforward, near-maximum-rate turns in each direction being possible without loss of height. On reducing speed the progressive yaw can be held with steady application of rudder, augmented by aileron as V_{mca} is reached at about 85 m.p.h.

In the circuit, with both powerplants in operation, a simulated overshoot in the approach configuration with full aft trim produced a nose-up reaction which could be easily held with one hand. Starting with 15° of flap the P.166 could be accurately trimmed for a downwind speed of about 120 m.p.h. reducing to 100 m.p.h. or so after skimming a 1,000-ft. ridge of rock bisecting the base leg at Villanova.

Full flap on finals then gave a very steep approach, the rate of descent being cushioned by engine power, and the speed being reduced to about 90 m.p.h. over the hedge. The elevator remains very responsive for a precise flare-out after power is removed, and yet the highly cambered NACA 230 wing section will not allow the P.166 to stall abruptly in even an exaggerated change of attitude before touch-down.

It is therefore very easy to achieve a smooth "grease-on" type arrival, with no ground-clearance worries for the high-swept rear fuselage. The P.166 then pitches gently forward on to its nosewheel, with which it can be steered during the short landing run. So flattering, in fact, are the landing characteristics that for my last circuit the Commandante went and sat in the back of the cabin, leaving me to enjoy the experience on my own. For this I respected his *dono di corragio* as much as the qualities of the P.166, but it was a very satisfactory conclusion to an extremely enjoyable experience.

Technical Data

DIMENSIONS.—Span, 46 ft. 9 in.; length, 38 ft. 0¼ in.; height, 16 ft. 4½ in.; gross wing area, 285.9 sq. ft.

WEIGHTS.—Empty (with standard equipment), 5,004 lb.; typical optional equipment, 350 lb.; operational empty weight, 5,354 lb.; max. fuel, 1,430 lb.; oil, 60 lb.; pilot, 170 lb.; four passengers, 680 lb.; baggage, 22 lb.; max. authorized weight, 7,716 lb.

PERFORMANCE.—(at max. weight) Max. speed, normal rated power, at 11,000 ft., 226 m.p.h.; cruising speed, 70% METO power, at 12,800 ft., 208 m.p.h.; cruising speed, 55% METO power, at 15,000 ft., 188 m.p.h.; initial climb, 1,305 ft./min.; on one engine, 263 ft./min. at sea level; service ceiling, 27,500 ft.; on one engine, 13,500 ft.; take-off run to 50 ft., 1,550 ft.; landing run, from 50 ft., 1,312 ft.; range, with 30-min. reserve, at 15,000 ft., 50% METO power and 178-m.p.h. average speed (six seats), 1,155 miles; with eight seats, 705 miles.

Pacific Cruisebird

Some reminiscences—which may be nostalgic to flying-boat passengers—by CAPT. SIR GORDON TAYLOR, G.C., M.C., *of his cruising venture with a Short Sandringham in the South Pacific.*

FIVE years ago my wife and I stood on the flying-boat slipway at Hamworthy and looked over the ex-B.O.A.C. Sandringhams resting there on their beaching gears. It was a sad and appealing sight to see these fine aircraft in from the far corners of the World, standing immobilized at their base in England. But for us it was an exciting prospect, for we were there to find a boat for our air-cruise venture in the South Pacific.

A good deal of experience on exploratory and other flights in the Pacific, with landings in the lagoons of remote atolls and in the lovely havens of the high islands, had inspired me to initiate what we called the Pacific Cruisebird Service; a way of escape to the South Sea Islands for dreamers of this lotus-eating life.

We very soon saw the aircraft we wanted, a Sandringham 7 ("Bermuda"), with better than first-class interior, perfectly suited to our purpose. Accommodation was arranged in separate cabins on two decks, with a very attractive bar-lounge on the lower deck. After passing through the cabins, I sat in the port pilot's seat on the flight deck and knew that this was our aeroplane. After the usual formalities we bought her, through W. S. Shackleton, and eventually flew her to our home base in Sydney, Australia.

The ferry flight to Australia was an unusual one. With every expenditure, however small, a critical one, I had to have a payload and this came up rather fortuitously. The R.A.A.F. was about to move out of Malta and some of the wives were anxious to reach Australia in time for new arrivals to their families to be born at home. So I arranged with Athol Townley, who then was Minister for Air, to provide the necessary air transport. We tried to make the long flight as comfortable as possible, taking 11 days on the route, and arrived at Sydney without incident and, I think, with happy and satisfied customers.

Then we set out to initiate the Pacific Cruises. I was warned, of course, by my friends in air transport, that the whole thing was economically impossible; that it would quickly destroy us financially, and that we ourselves would end up "on the beach." There is no doubt that in principle they were right; but we both have a complex about the air and the sea which could be satisfied only by a flying-boat in the South Pacific. So I tried to evolve a new economic approach which might hold out some hope of survival for us, and this turned out to be based upon the opposite to all air-transport economics: low utilization.

By purchase of an aircraft at low capital cost, the hideous spectre of writing off, under pressure of the highest utilization, an aeroplane costing some astronomical figure could be avoided. We could thus also avoid the gigantic overhead costs which go along with such operations in the form of a vast and revenue-consuming ground organization. By running only a few cruises a year we could cope with this aeroplane with virtually no overhead organization at all.

For regular maintenance I employed one very highly qualified engineer, who also was flight engineer on operations. For maintenance and overhaul beyond his scope we had an arrangement with T.A.A., who were my general agents, and with Qantas.

I, admittedly, drew very little from the enterprise as captain of the aircraft. Spiritual fulfilment and physical fitness in a

(*Continued on page 411*)

Photographs copyright "The Aeroplane"

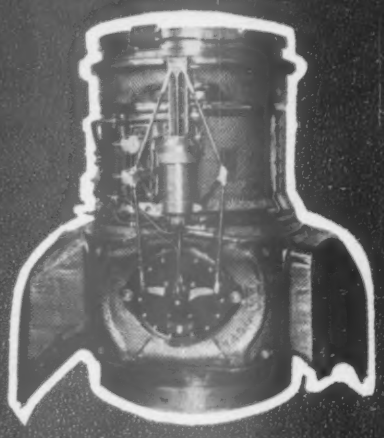
The photographs on this page and page 411 show "Frigate Bird III," then G-AKCO, at Cowes in October, 1954, after being overhauled and fitted-out by Saunders-Roe. Later appropriately re-registered as VH-APG, this Short Sandringham 7 was previously one of B.O.A.C.'s Bermuda-class boats.

Successful heat exchange and heat insulation

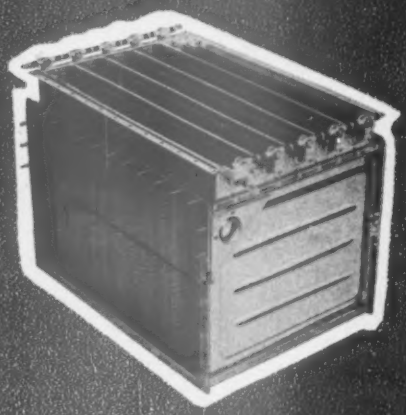
Success in our business doesn't merely mean the ability to manufacture, though we are extremely well equipped, even to the extent of having our own aluminium flux bath brazing plant.

Success to us, means the ability to solve problems ; to produce something that will do a new job, or perhaps an old job in never-before-experienced circumstances. And then, of course, to make it a practical and economical proposition.

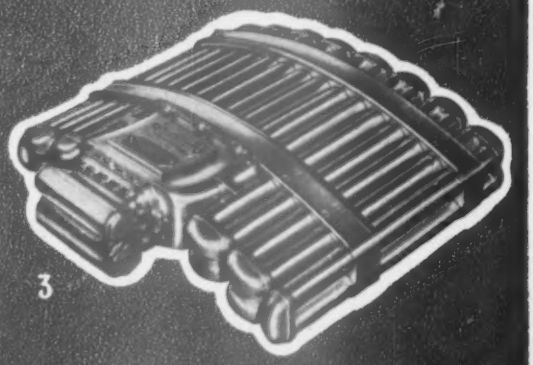
We have forty years experience and wide resources. If we can help you in any way with heat exchange and insulation equipment, please contact us. We are always at your service.



1



2



3

These thermal blankets are made of refractory fibre cased in .004 inch (.1016 mm) stainless steel. They are made-to-measure and are extremely light, the dimpled construction being responsible for their great strength. Specified for Rolls-Royce and Armstrong Siddeley jet and turbo-prop engines, these particular examples are shown fitted to the Rolls-Royce thrust reverser for the de Havilland Comet.

1

We design, manufacture and supply heat exchangers for many purposes in both aluminium alloy and stainless steel. This particular example is for the Vickers Vanguard's anti-icing system. Similar units are being supplied for the Fokker Friendship, the Bristol Britannia, the Armstrong Whitworth Argosy, the Vickers Viscount and the Handley Page Herald.

2

High pressure fuel-cooled oil cooler for high performance gas turbine engines. This unit is used in the Armstrong Siddeley Sapphire S.A.7.

3

Delaney Gallay LTD

Vulcan Works, Edgware Rd., London, N.W.2. Tel: GLAdstone 2201

We have now introduced Sealed Thermal Insulation Blankets for Civil Aircraft

World's newest, fastest long-range jetliner...

The Boeing 707 Intercontinental, shown above on its first flight, will bring a new order of performance to the air routes of the world when it goes into service later this year.

This new Boeing jetliner has greater range and payload capabilities than any other jet transport. With a range in excess of 5,000 miles with full payload, it is designed to fly nonstop over the longest stages of airline routes. Cruise speed is more than 600 miles per hour.

The Intercontinental is a longer-range sistership of the 707 Stratoliner. Although it is the world's newest long-range jetliner, the Intercontinental is a *proved* aircraft . . . backed by more than 4½ years

the Boeing 707 INTERCONTINENTAL

of flight testing of the 707 prototype, as well as extensive test programmes completed by production 707s. In service since last October, the 707 Stratoliner has been demonstrating the unparalleled passenger-appeal of Boeing jets. Public response, in the words of the operating airline, is " the most enthusiastic to a new airliner in aviation history."

*These airlines have ordered 707 and shorter-range 720 jetliners (*indicates Intercontinental purchasers):*

*AIR FRANCE • *AIR INDIA • AMERICAN • *B.O.A.C.
BRANIFF • CONTINENTAL • CUBANA • *LUFTHANSA
*PAN AMERICAN • QANTAS • *SABENA • *SOUTH AFRICAN
TWA • UNITED • VARIG • *Also* MATS

BOEING 707 *Intercontinental*

Arnhem Land Aboriginal bark drawing.

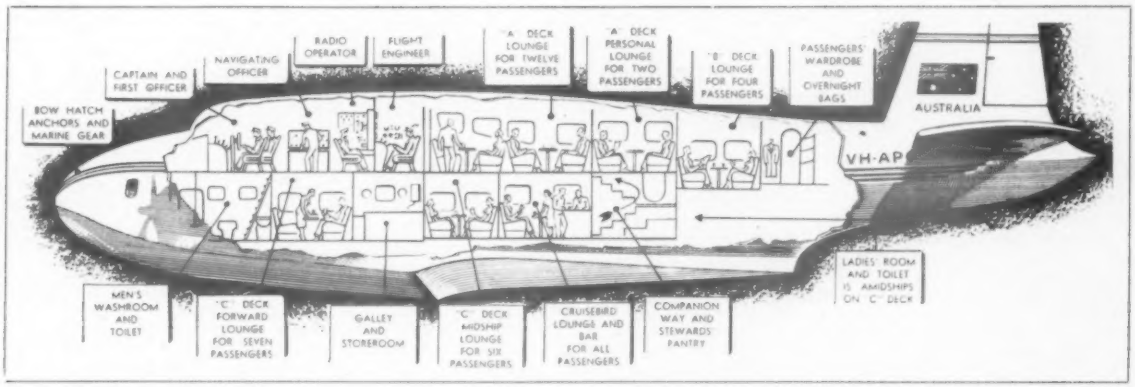
Men of Skill and Experience

WALLY TOMS

Shell Fuelling Operator
at Kingsford-Smith Airport,
Sydney, Australia

ONE OF THE MEN RESPONSIBLE FOR SHELL WORLD-WIDE AVIATION SERVICE

SHELL


CAPTAIN AND FIRST OFFICER
NAVIGATING OFFICER
RADIO OPERATOR
FLIGHT ENGINEER
"A" DECK LOUNGE FOR TWELVE PASSENGERS
"A" DECK PERSONAL LOUNGE FOR TWO PASSENGERS
"B" DECK LOUNGE FOR FOUR PASSENGERS
PASSENGERS' WARDROBE AND OVERNIGHT BAGS
BOW HATCH ANCHORS AND MARINE GEAR
AUSTRALIA
VH-APG
MEN'S WASHROOM AND TOILET
"C" DECK FORWARD LOUNGE FOR SEVEN PASSENGERS
GALLEY AND STOREROOM
"C" DECK MIDSHIP LOUNGE FOR SIX PASSENGERS
CRUISEBIRD LOUNGE AND BAR FOR ALL PASSENGERS
COMPANION WAY AND STEWARDS' PANTRY
LADIES' ROOM AND TOILET IS AMIDSHIPS ON "C" DECK

This schematic drawing shows the layout of "Frigate Bird III" as arranged for the Pacific cruises. Air travellers of the earlier post-war era still remember, with regret, the feeling of spaciousness in the hulls of passenger flying-boats.

(*Continued from page 410*)

job I love were my reward. Captain Harry Purvis, chief officer of the aircraft ("Frigate Bird III"), came off his grazier's property to fly on each of the cruises. Tom Bennett, our second officer, was always loaned to me by T.A.A. and that made up the flight-deck crew of four. Johnnie Green and his charming wife Jeanne from Tahiti were purser and stewardess respectively.

Everybody worked, with immediate and direct results, on the cruises. There was virtually no paper-work, beyond log books and the normal record requirements of the Department of Civil Aviation.

Most of the cruises were sold from the end of a telephone in our own office. The result was that, strangely enough, we did survive. We had a great deal of fun and, I think, gave some pleasure to our passengers and guests who travelled with us, and some very painless education to a number of Australian people in providing a knowledge of our own region of the South Pacific.

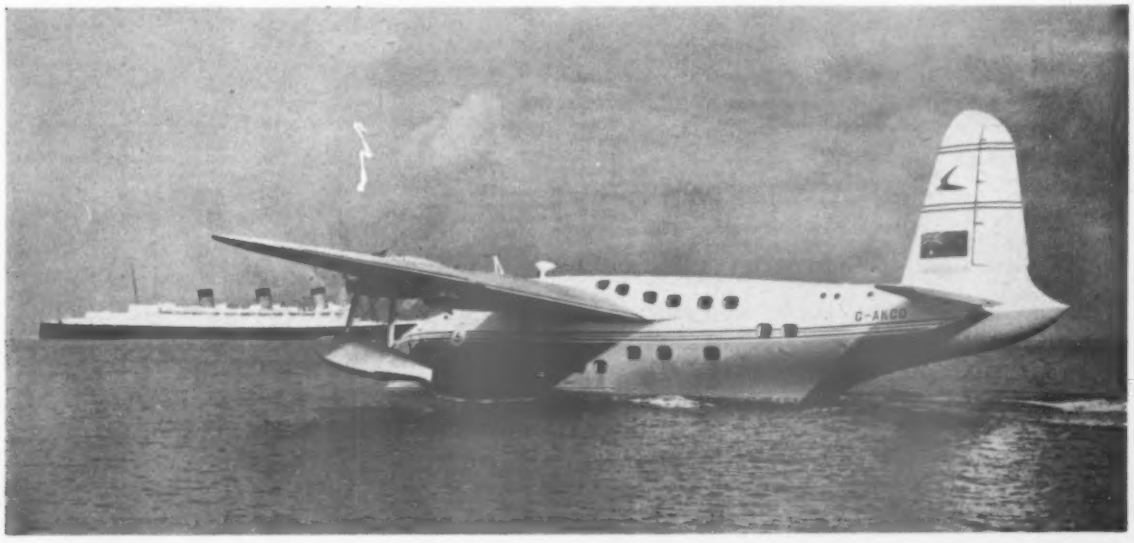
At the time when we had stood on the ramp at Hamworthy we agreed that we would do this for five years; then take another look at the World and decide our next move. It was almost exactly five years later that we sold the aircraft to T.A.I. for their flying-boat connection between Bora Bora and Tahiti. In this time we never had an engine failure or an unscheduled engine change; and never a delay even of one minute for breakdown of any kind. Once we had a 24-hr. delay at Tahiti for weather; heavy rain, with virtually zero visibility, which had discoloured the water in the coral lagoon and created a hazard for any aircraft movement on the water.

The aircraft was never damaged, though we ranged far and wide in the South Pacific operating to islands of our choice and often, I know, outside the conditions of our aircraft insurance. I had, however, complete confidence in our aircraft and she never let us down. My friends in the insurance world from their offices in London must, I know, have been somewhat horrified at the prospect of insuring this aeroplane for its proposed operations, but I myself knew it was one of the safest, though unorthodox and flexible, of any undertaken by insurance. We never had a claim.

And, miraculous as it may seem, we never had a visibly dissatisfied passenger, except, perhaps, one I can remember for whom the glamorous anticipation of Tahiti did not work out exactly as planned. That, however, was a private affair, not within our claims to entertainment. But we had the backwash from it all the way back to Suva.

I purposely use the word "visibly" above, because I am sure that in some circumstances ashore our passengers showed great forbearance. Wherever possible we arranged the best hotel accommodation, but the whole spirit of the Cruisebird Service was experience of the real thing, at remote islands—away from the regular commercial centres; and sometimes we camped on the beach. But always there was the return to the aircraft, which was our ship and our home.

I finish this story with a salute to a great aircraft, the Short flying-boat "Bermuda" with Pratt & Whitney R-1830 engines: VH-APG, "Frigate Bird III."



The Sandringham 7 taxies out for an early test flight at Cowes—with the Cunarder, R.M.S. "Queen Mary" in the background.

A Happy Warrior

"CALL no man happy," wrote Herodotus, "until you know the nature of his death," and having been privileged to know John Brodie for most of the 30 years that have passed since the present editor of THE AEROPLANE first joined that weekly, one knows how much justification there is for asserting that this was indeed a happy warrior, working at max. permissible cruising power till the end. At his office in high spirits on Friday he was taken ill over the week-end and died in Putney Hospital on the Monday, March 23.

When he died, aged 59, John Brodie, M.I.Mech.E., F.R.Ae.S., Hon. M.S.L.A.E., was engineering director, the de Havilland Engine Co., Ltd. His passing may well be reckoned as marking the end of an era. When John Brodie began work at Dumfries, aeroplanes were relying on rotary piston engines; when he died the in-line and radial piston engine had been replaced almost universally by the turbine. Not only had he played a leading part in engineering this historic change but in the last 10 years of his life he also carried a heavy administrative responsibility in planning the rocket engineering developments of the company.

Throughout his long happy working life he derived his inspiration from, and gave his loyalty to, his life-long chief, the late Frank Halford.

Such a man must be missed, not only by his friends who are legion in this country and overseas but also by the younger generation to whom through the de Havilland Technical School and its Old Boys' Association he gave his ardent support.

John Longmuir Penman Brodie was born on June 1, 1899. Educated at Dumfries Academy he served his apprenticeship, 1914 to 1919, with the motorcar manufacturers Arrol-Johnston, Ltd., in Dumfries. He was in the Royal Air Force for a short period in 1918-1919 as a fitter instructor.

During his apprenticeship John Brodie worked on the design of the Beardmore-Halford-Pullinger engine, the famous B.H.P. 230 h.p. water-cooled six-cylinder aero-engine. This work brought Brodie into contact with Halford.

In 1919 Brodie spent some months as an engine designer with Whitworth Engineering Co., Ltd., and he was chief draughtsman of the Glendower Aircraft Co., Ltd., in 1920-21. To broaden his experience, now into the commercial motor vehicle field, he served with James Bartle, Ltd., as chief designer from 1921 to 1923.

When Halford decided to set up in business in London as a designer, he sought out Brodie to assist him. On November 23, 1923, they began work in North Kensington.

The Aircraft Disposal Company of Croydon, were exploiting the Airdisco and Nimbus aero-engines. The 140 b.h.p. Airdisco was being developed from the 90 Renault and the 335 h.p. Nimbus was being developed from the Puma. Halford and Brodie moved office to Croydon Airport in 1925. In June that year they were joined by Brodie's friend W. H. Arscott, now chief designer of the de Havilland Engine Company.

To meet de Havilland's requirement for a practical light aeroplane Halford evolved the Cirrus engine from the Airdisco, and Brodie worked hard and long on the job. He always remembered the letter that came from "D.H." saying how he thought that a 60 h.p. four-cylinder in-line engine would be ideal for his purpose, and that "a half of the V8 Airdisco 140 h.p. engine" would probably do very well indeed.

Brodie's first recollection of going to Stag Lane was in connection with installing the Airdisco into the D.H.51 aircraft, but he did not get to know de Havilland and the team until the winter of 1924-25, when the Cirrus Moth G-EBKT was being prepared for its first flight on February 22, 1925.

Halford and Brodie went to work in October, 1926, to design the Gipsy engine. It was out and running the following year, giving 120 h.p. for about 300 lb. of dry weight. Brodie supervised its development and all the effort of installing it in the racing Tiger Moth monoplane, D.H.71, in which Hubert Broad attained a World speed record of 187 m.p.h. The engine was detuned to 100 h.p. for a career as the Gipsy One in the Moth.

Thus began the great family of Gipsy engines, with every one of which John Brodie has been directly and responsibly concerned, during more than three decades. In this time was evolved the Gipsy Two, with slightly increased capacity, it was inverted for the Puss Moth, developed as the Gipsy Three and the Gipsy Major—engine of the Tiger Moth biplane, the Dragon, the Chipmunk and innumerable other aircraft.

The Gipsy Six was produced in 1933 for the Dragon Rapide. A "hotted-up" version of the Six powered the victorious Comet racer D.H.88 in the Mildenhall-to-Melbourne race in October, 1934. The Gipsy Twelve inverted-V engine was designed in 1936 for the four-engined Albatross airliner—its career cut short by the 1939 War. There were also two smaller Gipsies, the 75 h.p. Gipsy Minor for the Swallow Moth and the 90 h.p. engine of the same name for the Moth Minor in 1937.

In 1940, whilst still assistant chief designer to Halford, Brodie took over the administration of the de Havilland Merlin Repair Department, which reconditioned 9,000 of the famous Rolls-Royce 12-cylinder liquid-cooled units. The following year he assumed the Engineering Management of the de Havilland Engine and Propeller Divisions, for both of which Major Halford remained responsible until 1943.

Halford, Brodie and Moult were commissioned to start the design work of Britain's first production jet engine, the Goblin, early in 1941. The first engine ran on the test bed, surrounded by barbed wire and armed guards, on April 13, 1942, just 248 days from the issue of the first drawings. An entirely new set of test and development conditions faced Brodie in making a dependable engine out of a gas turbine, and this he duly achieved.

The Ghost, of similar form, followed, first as another military engine. Then it was required to power the Comet airliner and Brodie took great pride in the task of redesigning to civil standards. Sixty per cent. of the detail drawings were redrawn.

Development of the Goblin and the Ghost, later the Gyron axial-flow engine and the present Gyron Junior, all the responsibilities of the Engineering Division, both before and since formation of the Engine Company in 1944, were the duty of John Brodie.

Pioneer Air Engineer

WITH the death, on March 20, of Mr. Leonard William Warner in Canterbury at the age of 73, the British Aircraft Industry loses one whose whole life had been spent in its service from the time as a young man of 24 he joined the brothers Short to help build their first aeroplanes 50 years ago. When he died he was a director of the Ratcliffe Tool Co., Ltd.

In the intervening period as a member of the Aeronautical Inspection Directorate he had been one of the Government team behind the successful R.A.F. entry for the 1929 Schneider Trophy contest. During the years of the last War as a member of the aircraft production organization he held progressively important posts until he became Deputy Director-General of Aircraft Production.

Four years after completing his five years as an apprentice in mechanical engineering, he joined Short Bros. at Leysdown, on the Isle of Sheppey, in 1909. There as experimental engineer to Mr. Horace Short he was associated with such pioneers as the Hon. C. S. Rolls, Mr. Cecil Grace and Mr. Ogilvie, and Sir Francis McClean and with Lord Brabazon, as he was to become. He worked on the engine installation and transmission of the aircraft in which Col. Moore-Brabazon won the *Daily Mail* prize of £1,000 for the first circular flight of one mile on an all-British aircraft.

In June, 1914, just before the outbreak of the first War with Germany, Mr. Warner joined the Aeronautical Inspection Department in which he was to serve so long. By the time war broke out he was concerned in the organization of the aerodromes for the reception, assembly and flight testing of aircraft coming from the production factories. After being assistant and then chief inspector of aero-engines, instruments, wireless (as it was then known) and armament, he became responsible, in 1928, under the late Col. Outram, for the technical direction of the staff inspecting complete aircraft.

In 1929, he was responsible for the inspection of the British aircraft in the Schneider Trophy contest. In 1938 he went to the United States to organize the inspection to British standards of the first deliveries of Hudson and Harvard aeroplanes then on Government order for this country.

On his return, in 1938, the problem was not to organize inspection but production. When Col. Outram was called in to take over the organization of aircraft production at the Air Ministry, "Plum" went, too. His first job was as assistant director in charge of bomber production, and from there over the war years he rose to be Deputy Director-General.

The bald statement of his promotion covers the fact that "Plum" provided that continuity of policy around which the Production Branch moved and had its growth. There were changes in the direction of the branch, but because "Plum" was there policy remained continuous. His encyclopædic knowledge of the industry and its ancillaries and of the working of departments was always available, and his wise counsels prevailed in many difficult affairs.

Sir Alfred Le Maitre

SIR ALFRED SUTHERLAND LE MAITRE, K.B.E., C.B., M.C., whose death at 62 occurred on March 22, was well known to many concerned with civil aviation. From 1948 he was with the Ministry of Civil Aviation and with the Ministry of Transport and Civil Aviation (after the two Ministries merged in 1953) until 1957, as Controller of Civil Aviation Ground Services. In that period the jovial manner and completely unabashed approach of "Jock" Le Maitre made him many aeronautical friends who will much regret his passing.

Educated at Fettes and at St. John's College, Cambridge, he served with the Black Watch in France in the 1914-18 War and entered the Admiralty in 1920. Under-Secretary to the Admiralty Delegation at Washington in 1944, he was appointed an Under-Secretary to the Admiralty in 1946 and to the Board of Trade in the following year.

He was created K.B.E. in 1951.

To make a ground-to-air guided weapon system mobile is not simply a matter of jacking it up and running some wheels under it. It needs an entirely different — and more challenging—approach. We know—for we were chosen by the British Government to concentrate on this very problem. And five years of design and development work have gone into the solution. **THE ANSWER IS**

THE 'ENGLISH ELECTRIC' THUNDERBIRD

—a complete mobile and *air transportable weapon system — fully developed—now in service with the British Army.*

Its mobility and ease of redeployment give the flexibility that is so essential to meet the nation's ever-changing defence requirements . . . **AND THE ECONOMY AS WELL**

ENGLISH ELECTRIC COMPANY LIMITED · GUIDED WEAPONS DIVISION: LUTON · STEVENAGE · WOOMERA

A MEMBER OF THE ENGLISH ELECTRIC AVIATION GROUP

GW22

. . . and talking of purity, I pointed out to him
that all fuel delivered to aircraft by AIR BP
is first put through a separator which removes
99.99% of any water present.

Quite right! Never mix water with spirits.

AIR BP

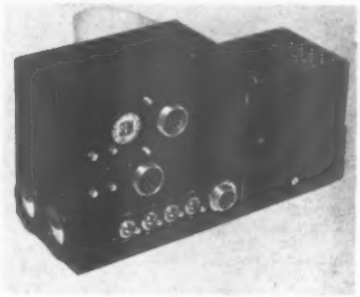
THE AVIATION SERVICE OF BRITISH PETROLEUM

News of Industry

Miniature Recorder

EMPLOYING a high-pressure mercury-vapour lamp and a special recording paper, the latest miniature recorder to be developed by S.F.I.M. (Great Britain), Ltd., of 216-221 Bedford Avenue, Slough, produces a visible record a few seconds after it is made. Known as the U.V. Recorder, it has overall dimensions of 4.2 in. by 5.8 in. by 11.3 in., and weighs less than 10 lb. It is a completely self-contained unit requiring one external power supply of 50-V. DC.

Up to six continuously varying and two discontinuous parameters may be recorded against a 1-sec. time base.



COMPACTNESS.—The lightweight recorder produced by S.F.I.M. (Great Britain), Ltd., of Slough. It weighs less than 10 lb.

Twenty feet of 60-mm. white paper can be accommodated in the recorder itself. If longer duration is required there is an external slip-on cassette which can contain a complete 100-ft. roll of recording paper.

The recording principle employed is conventional in that each of the recording elements is provided with its own mirror. The image of the light source is reflected by the mirror in such a way that a spot of light traverses the length of the recording aperture for the full-scale range of the element.

Pressures and accelerations can be measured directly with special elements without having first to translate the quantity into electrical parameters. Acceleration can be measured simultaneously in all three planes, and pressure can be recorded down to an absolute pressure of 20 mb., or over 14 different ranges of differential pressure from ± 30 mb. to 1,600 mb. (22 p.s.i.).

Production Facilities

IN his statement at the recent annual general meeting of BTR Industries, Ltd., the chairman, Sir Graham Hayman, gave some facts on a number of the group's new products and manufacturing facilities. These included details of the company's Aero Products Division (Palmer Aero Products, Ltd.) and the Microcell Group, consisting of Microcell, Ltd., and its associated companies, Glass Yarns and Deeside Fabrics, Ltd., and Artrite Resins, Ltd.

To cater for the requirements of the aircraft industry the group has reorganized and re-equipped its production facilities, and has introduced new products, including flexible pipe assemblies incorporating PTFE. These are made under a licence agreement with the Resistoflex Corpn. of America, and are marketed under the name of Fluoroflex. They are being fitted in the Comet 4B, which also incorporates Palmer metallic flexible pipes and Corroflex corrugated-steel piping.

Under licence from the Garrett Corpn. of the United States, Palmer will be supplying B.O.A.C. with inflatable escape slides.

As has been stated earlier, BTR Industries, Ltd., has acquired the whole of the capital of Microcell, Ltd. While the expanding activities of this group have to a substantial degree been based on Government contracts, there is now a steadily increasing development of commercial activities. With its main manufacturing centre at Camberley, Surrey, the basis of the work of the Microcell Group is glass fibre.

Liquid Oxygen Storage

TWO of the latest developments for the storage and supply of liquid oxygen will be on show on the stand of the British Oxygen Co., Ltd., at the Engineering, Marine, Welding and Nuclear Energy Exhibition at Olympia between April 16 and 30.

The first is the LC.3 liquid-oxygen cylinder which has been developed to supply oxygen to those customers who do not require the larger liquid-oxygen installations. The cylinder consists of a vacuum-insulated vessel containing liquid oxygen, and incorporates a vaporizing unit so that the oxygen is drawn off as gas. It holds 2,900 cu. ft. of oxygen and will supply gas at the rate of 300 cu. ft. per hour at a pressure of 85 p.s.i. Its dimensions are 58 in. by 20 in. and it weighs 255 lb. when empty.

Gas from the cylinder is led through the manifold and a central isolating valve to a heater coil, beyond which the pressure regulator giving a maximum line pressure of 70 p.s.i. is fitted.

The second development consists of a Coval, which is a vessel designed for outdoor operation, to receive liquid oxygen from B.O.C. transport vehicles and convert this liquid oxygen to gaseous oxygen at a pre-determined automatically controlled pressure. The maximum steady rate of gas supply is normally 30,000 cu. ft./hr., but short duration peaks are possible, the magnitude depending on the duration. The maximum pressure delivered from the Coval unit to the customer's pipeline is 230 p.s.i.g.

Its effective capacity is 125,000 cu. ft. of liquid oxygen (equivalent gas volume); or 100,000 cu. ft. of liquid nitrogen or 122,000 cu. ft. of liquid argon. A stainless-steel vertical cylinder, mounted inside another cylinder of mild steel, holds the liquid. The two cylinders are separated by special insulating blocks, the annular space between them being filled with a powder insulant and evacuated to a very high degree. The outer vessel is mounted on three legs, the overall height of the unit being 15 ft.

A vaporizing unit is necessary for use in conjunction with the Coval to vaporize the main liquid flow, to produce a pressure above the liquid and also to raise the temperature of the direct gas take-off from that of liquid oxygen to ambient temperature. This vaporizing unit consists of a hot-water tank heated either by electrical immersion heaters or by steam. The Coval instrument panel is mounted in a cubicle attached to the outer vessel and is provided with a suitable protection against weather conditions.

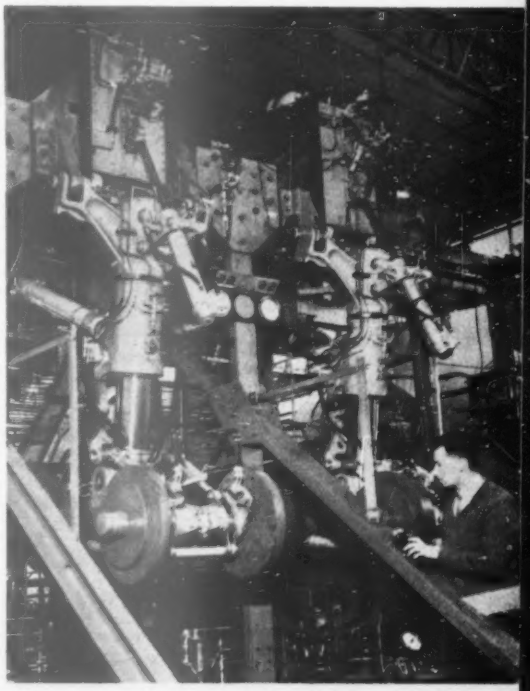
Britannia Undercarriage Test

BRITISH MESSIER, LTD.'s test hangar at Gloucester was the scene of the recent endurance test made with the undercarriage of a Bristol Britannia; the accompanying photograph was taken to mark the end of a "4,000 repeat retractions programme." The effect on the hydraulic system has been fully equivalent to 4,000 flights (or about six years' life) of the aircraft.

The test was the climax to developments which have been taking place over several years, the aim of which was to ensure that the Britannia hydraulic system will function successfully in all conditions all over the World.

Britannia aircraft now fly about 2½ million miles a month, and the low incidence of hydraulic system trouble is a tribute to the thoroughness of development and testing by British Messier.

The complexity of the hydraulic system of the aircraft is appreciated when it is realized that it uses 2,000 ft. of piping and 110 separate hydraulic components, and that each of the two main undercarriages weighs about a ton; yet it can be raised or lowered in less than 10 sec.



GRUELLING TEST.—This is the Britannia undercarriage unit by British Messier used in the endurance test referred to in the accompanying paragraph.

Private Flying

H.J.C.'s CLUB COMMENTARY

● ONCE AGAIN the **Tiger Club** is planning a series of air displays throughout the year. As mentioned last week, the first was to be at Sywell over the Easter holiday. The next is to be at Whitsun, May 17-18, and organized by Auto-Sport, Ltd. Where it is to be is not yet decided.

On June 6 and 7 a show will be given at Skegness in connection with the flying week-end organized by the **Skegness Aero Club;** the Tiger Club's own aerobatic competition and race meeting will be at Stapleford Tawney on June 13 and 14

The club's aircraft will be at Coventry for the National Air Races and British Lockheed aerobatic competition at Baginton, July 9-11, and there will be another show at Sywell on July 12.

Auto-Sport, Ltd., is organizing two more displays at which the Tiger boys will be present: at Ramsgate on August 3 and at Sandown, Isle of Wight, on August 30. The club will also assist with aero-tows during the National Gliding Championships, from May 9 to 14, at Lasham.

Aircraft of the club are at present hangared both at Croydon and at Fair Oaks. The Arrow Active, G-ABVE, is being rebuilt after its last *contretemps*. It is now to have a redesigned fin and/or rudder, which should improve its flying characteristics.

BOYS AT BIGGIN.—Ready for training flights with the R.A.F. at Biggin Hill are these A.T.C. cadets. Left to right, Roger Holness, 16, of Swanley; John Sellars, 16, of Orpington; Martin Walmsley, 15, of Beckenham; Keith Godfrey, 15, of Sydenham, and Cpl. Clive Hutton, 19, of Hayes.

● IT IS understood that the European Air Tour which we mentioned last week is to become an annual event and will eventually be increased in scope until it resembles the pre-War air tours which went right round the Continent.

This year's, to be held from June 17 to 21, is being organized by the national aero clubs of Holland, Belgium, France, Germany and Luxembourg, with the first-named in overall control. British pilots who want to attend should apply to the Air Touring Department of the Royal Aero Club.

On June 17 participants will assemble at Rotterdam, where there will be sight-seeing and a dinner/dance, followed by a flight into Belgium the next day for lunch, and later a flight to Vittel, about 45 miles south-west of Nancy.

Friday, June 19, will take the tour to Coblenz, in Germany, for sight-seeing and dinner, and on the following day Luxembourg will be visited. The Luxembourg Aero Club is this year celebrating its 50th anniversary, and will arrange a farewell dinner for the participants in the tour, who will leave for home the next day.

Prizes will be awarded for various achievements during the tour.

● AN enterprising member of the **Surrey and Kent Flying Club** has dug out some interesting historical facts about Biggin Hill, whence the club now operates; he states, among other things, that the land itself is mentioned in Domesday Book as having been given to Odo, Bishop of Bayeux, by William the Conqueror.

The aerodrome was officially opened on February 13, 1917, although even before then the War Office had designated Biggin as an emergency night landing strip. Sometimes known as Biggin on the Bump, the aerodrome played an important part in the defence of London during the First World War, when fighters took off from there by day and by night to combat raiding Gothas. Its part in the Second World War, particularly the Battle of Britain, needs no emphasis here.

The club's newsletter states that the aerodrome "has turned out to be even better than we dreamed it would be." A breakfast patrol is planned for April 12 (attacking aircraft to arrive between 09.00 and 09.30 hrs.) and an "At Home" party will be held some time in July. It is understood that the R.A.F. will stage the usual Battle of Britain show in September.

The club's staff has been increased because of the need for doing its own maintenance and refuelling. Albert Bowyer is chief engineer, and he and Ron Jones look after maintenance, with Dennis Cass on the refuelling side. A full-time barman—Brian Bisley—is now employed and the restaurant is run by Don Dillow.

Gliding Notes

by Dr. A. E. Slater

LIFT inside a large cumulus cloud is likely to be smoother than inside a small one, said David Ince in a lecture at the Kronfeld Club on instrument flying, until you reach the top of the cloud. Then things begin to happen, especially to your airspeed. However, your attitude (i.e., relation between your longitudinal axis and the horizontal) doesn't change much, so there is no need to react violently to every jump of the A.S.I. needle.

Another point to remember, when trying to maintain normal gliding attitude in a turbulent cloud is that a nose-up position is indicated by decreasing airspeed, not by the airspeed remaining stationary at a low figure; similarly, in a dive the airspeed is increasing, not stationary at a high figure (unless you have reached terminal velocity).

* * *

In a discussion on the use of a Link trainer to teach people the art of finding the central core of a thermal, Lorne Welch expressed disapproval of the method because the pupil is trained to do it by watching the compass heading. Do you do this in cloud, he asked? No; when you feel a kick in the pants, you increase your rate of turn.

However, pilots rarely find thermals entirely by feel, and the temptation to watch one's variometer continuously while circling is a potential cause of collisions. Instruments which register by sound instead of by sight came in for discussion, including a scheme of Peter Temple's by which the number of clicks sounded per second gave the number of feet per second of rise or fall—rise was registered in one ear and fall in the other. Someone is now developing this idea.

Another idea is an audible variometer to give out a note of variable pitch. Unless the pilot has a sense of absolute pitch, he would need a standard for comparison, in the form of another note of constant pitch, and one could get tired of listening to Middle C for hours on end. A member of the London Club is at present designing an audible variometer which will give out a dash-dot code.

* * *

NEWS from New Zealand tells of a gain of height of 27,000 ft. by S. H. "Dick" Georgeson, who reached 29,000 ft. a.s.l. on January 2, flying solo in his Eagle. He started from the North Otago Gliding Club's Christmas camp at Omarama, and gained his height over the head of Lake Pukaki, which is 30 miles due south of Mt. Cook and 20 miles in the lee of the crest of the Southern Alps, which run S.W./N.E. He had some icing, but the cold was bearable. This was not his highest flight, for he reached 32,500 ft. in the Eagle last September, also in a lee wave.

Another club member, John Trotter, reached 15,000 ft. and flew 55 miles solo in a Bergfalke, taking 3½ hr.

Meanwhile the Christchurch Club was flying from its new site at Burnt Hill, where members have built a 60-ft. hangar, having been turned off Harewood airport by increasing aeroplane traffic, after using it for 11 years. On January 1 J. Evans reached 13,200 ft. in a Skylark 2, gaining 11,200 ft., from release, and Matthew Wills, described as the club's patron, climbed 6,000 ft.

* * *

KENT GLIDING CLUB made its last flights from Detling on March 14, when a man came running up shouting: "What are you doing? We wrote to you two weeks ago." This was the day on which the chairman of the British Gliding Association complained at its annual meeting of lack of Government interest. Two days later came news that the Halifax Gliding Club, one of those he had described as being repeatedly refused the use of an airfield, had at last found a home by buying a 120-acre farm at Ringstone Edge, Barkisland, near Halifax.

Detling airfield was the site of the first flights after the British gliding revival of early 1930. The first Kent Gliding Club, formed on January 4 that year, produced a home-built primary in five weeks and tried it out on February 23; a vast concourse of people came to watch, and nearly rioted when all they saw was a few short hops. More recently it was the site of a training school for Air Training Corps instructors.

Correspondence

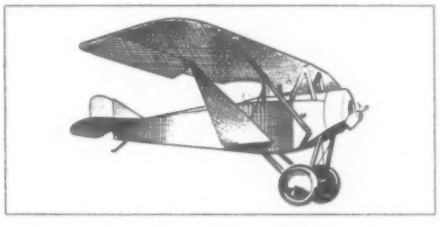
Sipowicz's Experiment

HAVING the privilege of being in contact with Dipl. Ing. Maj. A. Sipowicz, I would like to add a few words of comment to Mr. Orwovski's description of his VTOL project (THE AEROPLANE, February 20 last).

The Heliplan was not the first work of this talented inventor. In the early 'twenties, while studying contemporary aerodynamic research findings, Sipowicz conceived the idea that a wing set at an anhedral angle would offer considerable advantages over a conventional one. He calculated that this layout should resolve the tip-stalling problems and improve stability and control, particularly at low speeds, and lift characteristics of the wing in general.

In the years 1924-1925, to test his theories in practice, Sipowicz developed at his own expense an experimental sesquiplane, featuring the top plane set at 2° anhedral and bottom plane at coarse dihedral, in the form of aerofoil-sectioned bracing struts. The machine, known as the Sipowicz 1, was an extensive modification of a Nieuport, and in addition to the redesigned supporting surfaces employed a tail unit adapted from the Balilla fighter. In 1925 and 1926 the aircraft made many flights with Sipowicz at the controls and proved to possess excellent handling qualities. Due, however, to complete lack of official interest, no formal trials were made and consequently no comparative data are available.

So far as the Heliplan is concerned, the only practical tests ever made were those with a crude model, in which a fan-type propeller was driven by a ¼-h.p. electric motor. The object of the tests was to obtain airstream measurements and determine effect of the dished ring design to induce the air flow. With the ring fitted some 10% increase in the lift value was achieved. No proper flying model of the Heliplan was ever constructed, and, due to complete lack of financial support, the revolutionary project was never developed.



Dipl. Ing. Sipowicz was responsible for several important improvements introduced on the aircraft in service with the Polish Air Force in the years after World War I, and was the author of a very efficient maintenance and repair system, which was officially approved for use in all repair and servicing establishments of the Polish Air Force and remained in force until the outbreak of the last war. He also contributed to the knowledge of flight mechanics and published some interesting works on the subject, the best known being his paper on stalling on turns, which appeared in several languages. In 1935 he became the managing director of the newly created State aviation works, the L.W.S., which was a successor to the privately owned Plage and Laskiewicz Works of Lublin, and held that post until the fall of Poland.

London, N.9. J. B. CYNK.

Munich Accident Report

I AM sorry to see that such an excellent technical journal as THE AEROPLANE (March 20) should have been blinded by the "science" of the usual "blame the pilot" Report issued by M.T.C.A. and the German authorities in the case of the Munich disaster.

Your comment mentions "melted snow had formed a layer of ice on the supercooled skin of the wing." The word "supercooled" is a scientific term which can only be applied to liquids cooled below their freezing point. The skin of an aircraft wing is made of metal.

If the Report intends to say that the wing was cold, it could say so, without misusing scientific terms. To prove that the wing was cold the Report states that the aircraft flew from Belgrade at a height of over 20,000 ft. The actual height was 16,000 ft. and *wing heating was applied* as is normal under such conditions. The wing and contents was probably well above atmospheric temperature.

Ice found on the wing some time after the accident was only to be expected when snow, melted by the fire, refroze in rough form and was covered by snow.

The "aerodynamic efficiency" of the wing supposedly covered by ice would be far better understood, with correct interpretation, if resolved into lift, a roughly vertical force, and drag, a roughly horizontal force.

In this instance the aircraft failed to reach flying speed whilst rolling in slush, and drag is the force involved. As a simple experiment I invite anyone to measure the top speed (and acceleration) of their car covered in ice and then clean. I doubt whether the difference is measurable. Next make the test whilst rolling in 1 in. of continuous slush, and check the very severe loss of acceleration and top speed.

Ice and frost, when present on wings, have caused many accidents due to loss of *lift* after flying speed has been reached. This aircraft could not attain flying speed due to the surface drag caused by slush.

Other flaws in the Report are too numerous to mention, but let us, at least, get the scientific side of it straight.

R. H. AYERS, B.Sc., A.R.Ae.S.

Woodford Green, Essex.

Groundabout

As of Now. A reader is appalled by what he calls "U.S. terminological wordisation and syntaxification," quoting these examples, with his own understanding of them:—

ACTIVITY: An organisational agency.
AGENCY: An organisational activity.
ENVIRONMENTAL: What the weather is like.
ENVIRONMENTALISATION: Putting anti-freeze solution in a car's radiator.
FLYABILITY: The potentialisation of fly-paper.
CAPABILITY: It can do.

Personally, I think the new language has a certain attractful repugnification and I look forward to the spreadability of more examplementalisation.

*

Non Sequitur

"Punch-line" seen on the bottom of a Misrair poster at Benina Airport:—'MISRAIR VISCOUNT —NON FASTER NON SAFER NON SMOOTHER'

*

Périssez la Pensée. Oliver Stewart asks me to deny the disturbing rumour that he is contemplating bringing out a special French Aircraft Industry number of *Aeronautics* in which all the weights, measurements and performance figures are in English.

*

Aviation with the Lid off. At a flying training school in the '20s crashes seemed to come in threes. On one occasion, after two crashes, fortunately with only minor injuries, everybody waited and sure enough there was a third disaster. The C.F.I., in his office, saw a figure in pilot's overalls, head heavily bandaged, being carried to an ambulance. He hurried out and asked what had happened. A voice from the stretcher said weakly: "It's all right, sir—I pulled the chain too vigorously and the top of the damn cistern fell on my head."

*

by Gren

NOTES AND EVENTS

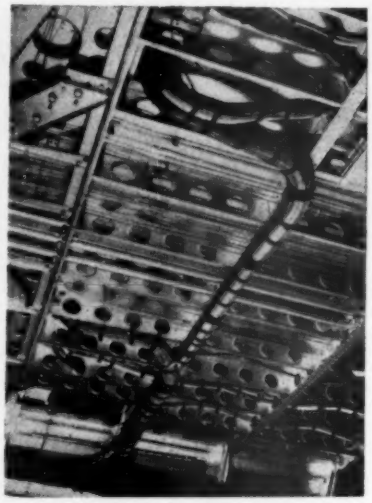
TV BY AIR.—On Good Friday an aircraft was to leave London Airport carrying a complete TV station, by Pye, Ltd., of Cambridge, for Adelaide, South Australia. Equipment of this sort is usually regarded as too heavy for air-freighting, but the manufacturers expect that money, as well as considerable time, will be saved; "idle time" will be cut to a minimum and insurance rates are reduced. A second station will be sent to Perth, Western Australia, later.

W/O COURSE.—The College of Aeronautical and Automobile Engineering at Chelsea is to give a course of training in basic electrics to wireless operators of Air Charter, Ltd., of Southend Airport. The course is to serve as a preliminary for operators receiving farther training by the Bristol Aeroplane Co., Ltd., in the Britannia electrical circuit.

DISPLAY MODELS. — Westway Models, Ltd., of 178 Brent Crescent, London, N.W.10, who specialize in making display and prototype models of aircraft, have produced a most interesting brochure. This illustrates 14 examples of the hundreds of model aircraft they have made for customers all over the World ranging from the J.A.P. Harding monoplane (contemporary of the Blériot) to a cutaway Boeing 707.

ENGINE RESEARCH.—The Furnace Division of Birwelco, Ltd., of Aston, Birmingham, has been awarded a contract by the Ministry of Works for an all-radiant air heater for the National Gas Turbine Establishment at Pyestock. It will heat air used in obtaining correct flight conditions when testing aircraft engines, and has a height of 73 ft. with an outer shell diameter of 22 ft. 10 in. and a radiant surface of 6,500 sq. ft.

AUTOSTAIR ORDER.—H. W. Edghill and Co., Ltd., of Hook, Hampshire, has received a contract from Trans-Canada Air Lines for supply of 21 Mk. 3 Autostairs mounted upon a Rootes Karrier Bantam chassis. The Mk. 3 is a larger model than the Autostair exhibited at Farnborough last year, which incorporated an Austin chassis.



IN THE ARGOSY.—Tersil cables, miniature cables and equipment wire by W. T. Henley's Telegraph Works Co., Ltd., are used in the Armstrong Whitworth Argosy. Some of them are seen in this close-up of the roof.

FOR MOTORISTS. — An innovation by Temple Press Limited is "'The Motor' Reference Yearbook, 1959," a pocket-size volume of 286 pp., 4¾ in. by 7 in. Edited by Philip A. Turner, this book contains a wealth of detailed information on a wide range of subjects; for example, a review of 1958's racing cars, lists of motoring records, production statistics, and numerous other matters of general interest. The price is 6s., or 6s. 9d. by post from the publishers, Bowling Green Lane, London, E.C.1.

Aviation Calendar

April 4.—Helic. Assn. of G.B. lecture, "Effect of Size of the Helicopter on its Economics," by R. Hafner (Bristol Aircraft) at Saunders-Roe, Ltd., **Southampton.**

April 4.—British Interplanetary Society lecture, "Some Implications of Radio Astronomy in the Fields of Navigation, Guidance and Communication," by C. M. Cade (Kelvin and Hughes) at Caxton Hall, Caxton Street, **London,** S.W.1, at 18.00 hrs.

April 7.—R.Ae.S. Boscombe Down Branch lecture, "The Development of the Rotodyne," by Dr. G. S. Hislop (Fairey) in the lecture hall, A. and A.E.E., **Boscombe Down,** at 17.45 hrs.

April 7.—R.Ae.S. Luton Branch debate, in the Napier senior staff canteen, **Luton Airport,** at 18.15 hrs.

April 7.—R.Ae.S. London Airport Branch, A.G.M. and lecture, "Power from Nuclear Energy," by Dr. M. D. Wood (Ruston and Hornsby), in the lecture hall, Fairey Aviation, Hayes, Middx., at 18.15 hrs.

April 8.—R.Ae.S. Chester Branch lecture, "Soviet Civil Aviation," by C. Jenkins, in the lecture theatre, Grosvenor Museum, **Chester,** at 19.30 hrs.

April 8.—R.Ae.S. Weybridge Branch lecture, "The Operation of London Airport," by J. Jeffs (Commandant, L.A.P.), at the Apprentice Training School, Vickers-Armstrongs (Aircraft), Ltd., **Weybridge,** at 18.10 hrs.

April 8.—R.Ae.S. Graduates and Students Section lecture, "The American Aircraft Industry," by Donald W. Douglas, Jnr. (Douglas Aircraft Co.), in the library, 4 Hamilton Place, **London,** W.1, at 19.30 hrs.

April 9.—R.Ae.S. Main Lecture at Preston Branch, "The Art of Developing Aero-engines," by A. C. Lovesey (Rolls-Royce), at the Bull and Royal Hotel, **Preston,** at 19.30 hrs.

April 10.—Helic. Assn. of G.B., "French Helicopter Developments," by L. F. G. Legrand (Service Technique Aéronautique, Paris), in the R.Ae.S. library, 4 Hamilton Place, **London,** W.1, at 18.00 hrs.

April 13.—R.Ae.S. Halton Branch lecture, "Some Experiences of an Airline Pilot," by Capt. O. P. Jones (B.O.A.C.), at the Branch H.Q., R.A.F. **Halton,** at 18.45 hrs.

April 14.—R.Ae.S. Bristol Branch, American lecture, by E. V. Rickenbacker (Eastern Airlines), at Filton House, **Bristol,** at 18.00 hrs.

April 14.—Institute of Metals, 1959 May Lecture, "The Scientific Uses of Space Exploration," by Prof. F. Hoyle, at the Royal Institution, Albemarle Street, **London,** W.1, at 19.00 hrs.

April 15.—R.Ae.S. Branch, A.G.M. in the lecture room, flying club, **Brough,** at 17.10 hrs.

April 15.—Aircraft Recognition Society, A.G.M. in the R.Ae.S. library, 4 Hamilton Place, **London,** W.1, at 19.00 hrs.

April 17.—Institute of Navigation lecture, "The Decca Trials," by Col. C. Powell (Decca Navigator Co.), at 1 Kensington Gore, **London,** S.W.7, at 17.15 hrs.

SOLAR CONTRACT. — The Solar Aircraft Co., of San Diego, has received a $1,771,000 contract from the U.S.A.F. to build gas-turbine-powered generator sets for the Boeing KC-135 jet tanker.

Company Notices

NEW COMPANIES

Aerial Agriculture, Ltd. (621,853).—Private co. Reg. Feb. 26. Cap. £1,000 in £1 shs. Objects: To carry on the business of experts and consultants in regard to farming and agriculture particularly by means of aerial spray application. Dealers in chemicals and fertilizers of all kinds for use on land, etc. Directors: Arthur H. L. Barwell, c/o 25 Chantry Close, Kenton; Ronald S. Jarvis, 11 Malden Park, New Malden; Frederick G. Spreadbrow, Friestoke, Fleet Road, Fleet. Sec.: F. G. Spreadbrow. Solrs.: Lawrence Barnett and Co., London, W.1. Reg. off.: 4 Queen Victoria St., London, E.C.4.

Channel Air Bridge, Ltd. (621,729).—Private co. Reg. Feb. 25. Cap. £1,000 in £1 shs. Objects: To carry on the business of carriers of passengers, mails, livestock, goods, vehicles and equipment by air, etc. Subscribers (each with one sh.): F. E. M. Hopkin and G. G. Ellstone, both of 59-67 Gresham St., London, E.C.2, clerks. First directors to be appointed by subscribers. Solrs.: Linklaters and Paines, 59-67 Gresham St., London, E.C.2.

Derby Airways, Ltd. (622,922).—Private co. Reg. March 12. Cap. £100 in £1 shs. Objects: To carry on the business of instructors in aviation, etc. Directors: Clifford A. Wilcock, 78 Buckingham Gate, London, S.W.1; Ronald R. Paine, Burnaston House, Burnaston, Derby, directors of Air Schools Group of Companies. Sec.: Mildred M. Ager. Reg. off.: 78 Buckingham Gate, London, S.W.1.

Swansea Gliding Club, Ltd. (621,678).—Reg. Feb. 24 as a co. limited by guarantee without sh. cap. The original number of members is 150, each being liable for £2 in the event of winding up. Objects: To promote, encourage and develop the sport, science and practical application of aviation and aeronautics, etc. The income and property of the association, whencesoever derived, shall be applied solely towards the promotion of its objects. The management is vested in a council, first members of which are Frederick H. Abraham, 64 Newton Rd., Mumbles, Swansea; Roy Beckett, 12 Oaklands Terrace, Swansea; Donald A. Garner, Robert J. Comley, Alun J. Y. Richards, Harri Kaiser and Graham W. Davies. Sec.: R. J. Comley. Reg. off.: 14 The Kingsway, Swansea.

Tradewings, Ltd. (621,779).—Private co. Reg. Feb. 25. Cap. £100 in £1 shs. Objects: To carry on the business of proprietors or operators of aircraft for all purposes, etc. Directors: John A. Oppenheimer, Laurenny, Totteridge Lane, London, N.20; Alan T. Grieve, Tithe Farm, Codicote, Herts, directors of St. Michael's Press, Ltd., etc. Sec.: Regina A. Ferebee. Solrs.: Taylor and Humbert, London, W.C.1. Reg. off.: 42 Wolfington Rd., London, S.E.27.

OVERSEAS COMPANIES

Continental Air Services, Ltd. (F.4,780).—Particulars filed March 12, 1959, pursuant to Section 407 of the Companies Act, 1948. Cap.: £1,000 in £1 shs. Reg. in Jersey, C.I., Nov. 2, 1957, to carry on the business of aerial conveyancers of all kinds, etc. British address: 25 Blackstone Rd., London, N.W.2, where Leonard Orman is authorized to accept service of process and notices. Directors: Ian J. Maclean, The Hague, Holland; Victor H. Jeffries, Rotterdam; Donald E. Le Boutillier, Mont Millais, Jersey; Donald E. Picot, Bagatelle, Jersey.

Birth Notices

Baker.—On March 18, at R.A.F. Hospital, Ely, to Vivien (*née* Lee), wife of Flg. Off. D. V. Baker—a son.

Barrow.—On March 14, at D.B.M.H., Imtarfa, Malta, to Maureen (*née* O'Callaghan), wife of Sqn. Ldr. B. A. J. Barrow, M.B., B.S.—a daughter.

Blunt.—On March 16, at Lytham Hospital, Lancs, to Mary, wife of Flt. Lt. C. Blunt—a daughter.

Hall.—On March 18, at the Louise Margaret Hospital, Aldershot, to Joyce, wife of Flt. Lt. D. P. Hall—a daughter.

Lewis.—On March 21, at Ellon Maternity Hospital, Aberdeenshire, to Liz (*née* Clarke), wife of Flt. Lt. P. J. Lewis—a daughter.

Manley.—On March 18, at the R.A.F. Hospital, Aden, to Audrey (*née* Rolfe), wife of Flt. Lt. R. W. Manley—a daughter.

Murray.—On March 12, at R.A.F. Hospital, Ely, to Daphne (*née* Bellam), wife of Flt. Lt. J. W. B. Murray—twin daughters.

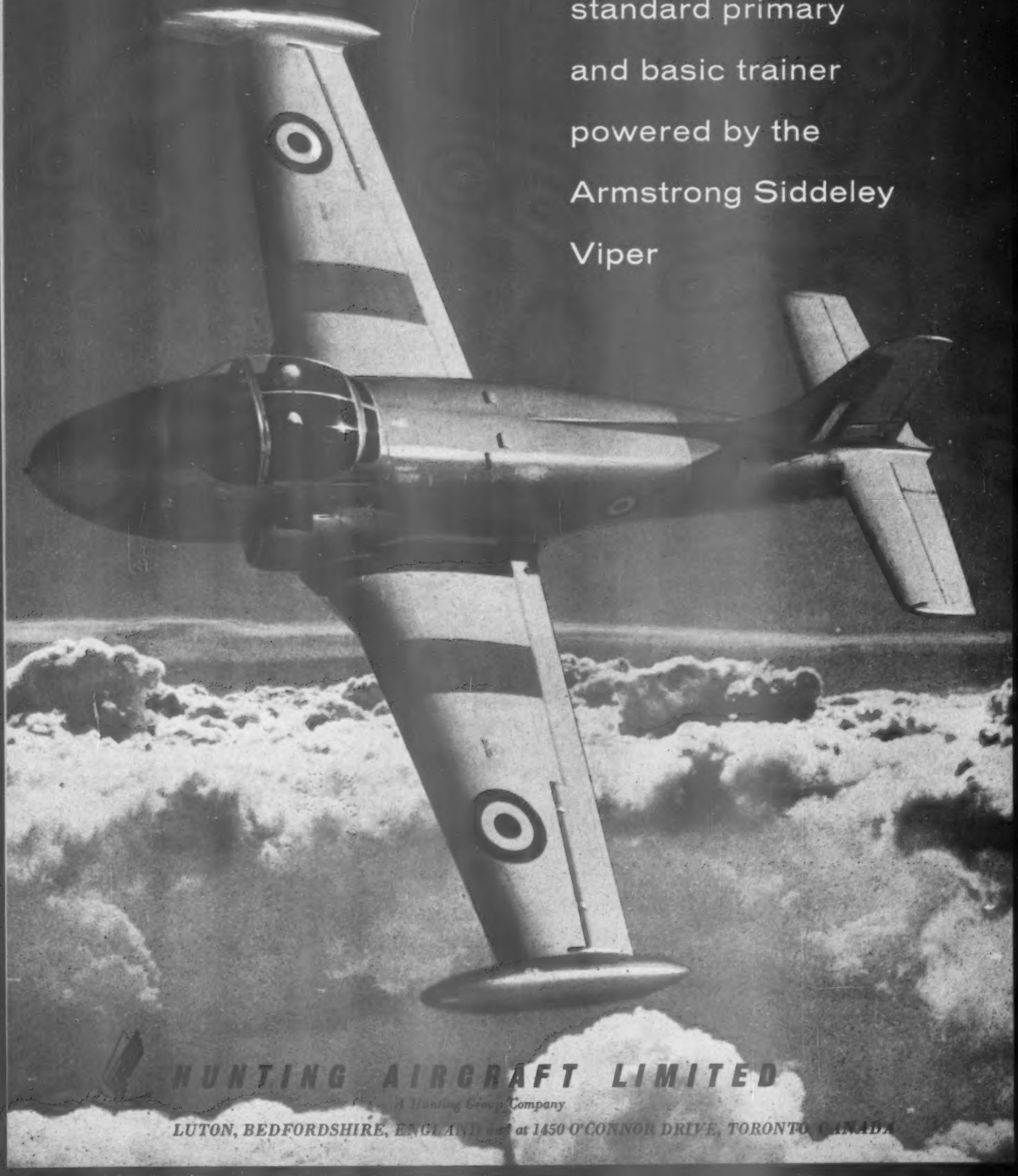
Perrin.—On March 12, at the County Hospital, Hereford, to Norma (*née* Taylor), wife of Sqn. Ldr. D. R. Perrin—a son.

MARRIAGE

Ramage—Chown.—On March 21, at St. Mary's, Shortlands, Beckenham, Peter Ramage, of THE AEROPLANE, to Martine, daughter of Mr. and Mrs. F. Chown, of Beckenham.

Jet Provost

The Royal Air Force standard primary and basic trainer powered by the Armstrong Siddeley Viper



HUNTING AIRCRAFT LIMITED

A Hunting Group Company

LUTON, BEDFORDSHIRE, ENGLAND and at 1450 O'CONNOR DRIVE, TORONTO, CANADA

THE AEROPLANE CLASSIFIED ADVERTISEMENTS

PRESS DAY: First Post, THURSDAY

RATE: 10d. per word (minimum 12 words 10/-).

AIRCRAFT FOR SALE

W. S. SHACKLETON, LTD.,
EUROPE'S LEADING AIRCRAFT BROKERS.
WE TAKE PLEASURE IN REMINDING
READERS OF THIS YEAR'S
SHACKLETON SALES WEEKEND
AT
OXFORD AIRPORT, KIDLINGTON,
ON
APRIL 24, 25 AND 26, 1959.

New as well as used aeroplanes of British, American and Continental manufacture will be available for sale there providing a unique opportunity of examining and choosing a private, club or business executive aeroplane from the best that is available. It is with great pleasure that we invite all readers to attend.

Our staff will be present throughout the meeting and full clerical facilities will be available to complete sales formalities as required.

In the meantime we offer a varied selection for your immediate consideration:—

MILES MESSENGER. Gipsy Major 1D engine, dual control, Plessey V.H.F., £1,585.

DE HAVILLAND BEAVER. STR.9X, offered with new certificate of airworthiness at £9,350.

BRISTOL SYCAMORE HELICOPTER. No flying since full overhaul by Bristo's; now based in Tanganyika; £12,000.

PIPER APACHE. 60 hours on airframe and engines since new in 1956, well equipped with radio and in superb condition, only £9,850; ex Belgium.

DE HAVILLAND DOVE. 10 passenger seats, de-icing, current British certificate of airworthiness, £11,850.

W. S. SHACKLETON, LTD.,
175 PICCADILLY, LONDON, W.1.
Phone, Hyde Park 2448-9.
Cable, "Shackhud, London." 483-14

ROLLASONS for Tiger Moths. Croydon 5151. zzz-657

MESSENGER 3-seater with dual control and radio in excellent condition. Gipsy Major 1D engine with 725 hours to go before complete overhaul, 12 months' or three years' certificate of airworthiness as required, price £1,500, ex-Perth Aerodrome. Apply Scottish Aero Club, Ltd., 1 Charlotte St., Perth, or Airwork, Ltd., Perth Aerodrome, Perth. 483-8817

GRUMMAN Widgeon VP-KNV amphibian, six seats, Queen II engines, D.H. propeller, full blind-flying panel, V.H.F. and M.F., R/T excellent condition, two years' spares available, fly away, Croydon. A. J. Whittemore (Aeradio), Ltd., Croydon Airport, Surrey. zzz-682

PROCTOR III, completely rebuilt with three years' C. of A., probably one of the best in the country. David Budworth, Ltd., Harwich, Essex. Phone, Har 116. 483-8821

TIGER MOTH, in excellent condition, Gipsy Major 1 engine with 800 hours to go before complete overhaul, certificate of airworthiness expires October 15, 1959, price £750, ex-Perth Aerodrome. Apply Scottish Aero Club, Ltd., 1 Charlotte St., Perth, or Airwork, Ltd., Perth Aerodrome, Perth. 483-8818

TRAVELAIR, LTD.,
AIRCRAFT SALES AND FINANCING
SPECIALISTS.

DE HAVILLAND Dove 2B, built 1953, low engine and airframe hours, S.T.R. 12D, V.H.F., AD7092 A.D.F., M.F. I.L.S., full de-icing, excellent condition, spar modifications accomplished, £12,500 for quick sale.

DOUGLAS DC6, long-range version, modification to 95,200 lb. take-off weight to be accomplished, nil hours since major overhaul or time expired, over-water radio, offers required.

DOUGLAS DC3 passenger cargo convertible, nil hours since major overhaul, £25,000.

ANSON Mk. I, new British C. of A., low engine hours, £1,900.

AND FOR THE PRIVATE AND BUSINESS PILOT.

NEW Mooney Mark 20, early delivery to British Isles, imported, duty paid, at under £6,850; America's best light aircraft.

AUSTER spraying aircraft, fully equipped for aerial work, £2,200.

CHIPMUNK Mark 22, 280 engine hours, 4 channel V.H.F., £1,550.

CHIPMUNK, 50 hours on engine since complete overhaul, C. of A. to 1960, £1,375.

MESSENGER, Cirrus Major 3 engine, 53 hours since complete overhaul, recent C. of A. overhaul, £1,675.

AUSTER Mark 5, low engine and airframe hours, V.H.F., L.R. tank, B.F. panel, starter, generator, new 3-year C. of A., £1,850.

PROCTORS; several available.

H.P. Terms gladly arranged, and for full details contact:—
TRAVELAIR, LTD., 115 Oxford St., London, W.1. Phone, Gerrard 3382. 483-20

DERBY AVIATION LTD
AIRCRAFT & ENGINE OVERHAULS
SALES — SERVICE — TUITION
SCHEDULED AND CHARTER OPERATORS
DERBY AIRPORT
Telephone: ETWALL 321

For immediate sale we offer
ONE AUSTER AUTOCRAT,
the last of a batch recently overhauled in our Derby works, whilst shortly we will have available another
CHIPMUNK 22
currently being overhauled and converted to full civil standards.
Details from our Derby offices.

LONDON OFFICE: Tel.: ABBey 2345
78 BUCKINGHAM GATE, S.W.1

SERVICE ENGINEERS
BLACKBURN & GENERAL AIRCRAFT LIMITED
BROUGH YORKSHIRE
require for work on the **N.A.39**
ELECTRICAL SERVICE ENGINEERS
Applicants should have had recent experience on modern high speed aircraft, and should preferably be educated up to H.N.C. standard. These are Staff positions with Contributory Pension and Free Life Assurance Benefits.
Applications please to the **Personnel Manager** *at the above address.*

For Narco and ARC radio equipment
Sole Distributors in Gt. Britain & Ireland
I.A.C.
62 Merrion Square, Dublin. Phone 62791

County Borough of Swansea
SWANSEA MUNICIPAL AIRPORT
APPOINTMENT OF **(a) MANAGER AND CONTROLLER (b) ENGINEER**

Applications are invited from persons suitably qualified for the appointment of (a) Manager and Controller of the Swansea Municipal Airport which has recently been opened. The salary will be commensurate with experience and qualifications but applicants are invited to state the salary range considered suitable; and (b) A & C Licensed Engineer. (Rapide and Auster essential.) Salary £800 p.a. Applications giving full particulars and names of two referees to be received by the undersigned by 20th April, 1959

The Guildhall, SWANSEA. **T. B. BOWEN, Town Clerk.**

R. K. DUNDAS.
PRINCE, PIPERS AND PROCTORS.

PERCIVAL Prince. The perfect flying boardroom, with five armchairs, tables, etc., an aircraft of outstanding appearance, performance and comfort, with maximum speed of over 200 m.p.h., and range close on 1,000 miles, suitable for up to 10 passengers or freight, this superb aircraft has alternative 5-seat executive seating; only 680 total hours, 330 and 254 on Alvis Leonides 550 h.p. engines giving exceptional single-engine performance; nil hours since top overhaul; full term C. of A., 10-ch. V.H.F., H.F., and radio compass. Offered, delivered anywhere in Europe, for only £10,500.

PIPER Super-Custom Tri-pacers. For those who consider they qualify for an Import Licence for business reasons, we highly recommend several of these excellent little 4-seaters, currently available through our New York office. Brief examples: 1953, 1,200 hours, 100 engine hours, £2,100; 1955, 830 hours, 160 engine hours, £2,450; 1957, 528 hours, 10 engine hours, £2,800. These all include Narco 12-ch. V.H.F., Omni, L.F. Rec., and prices include delivery to U.K., duty extra.

PROCTORS. We offer an excellent Proctor V, 4 seats, dual control, long-range tanks, and STR 9X 10-ch. V.H.F. Only the second long-ranger we've had for sale in many months, total hours only approximately 500, with new C. of A., £850.

R. K. DUNDAS, LTD., Dundas House, 59 Saint James's St., London, S.W.1. Phone, Hyde Park 3717. Cables, "Dunduk, Piccy, London." 483-17

MILES Hawk Trainer III G-AJRT, fitted with coupe head, ideal aircraft for racing, engine hours 1,172, airframe hours 2,055, airframe hours since C. of A. 6; this aircraft has just been through a very comprehensive C. of A. overhaul and has fully met the conditions of Notice No. 50, C. of A. expires 23.10.61. Price for quick sale, £495. Goodhew Aviation Co., Ltd., Oxford Airport, Kidlington. Kidlington 3355. 483-8

HANTS AND SUSSEX AVIATION, of the Airport, Portsmouth, offer the following three completely rebuilt high-quality zero-houred aircraft for sale:—

AVRO 19 Series 2, metal wing, nil hours all round, 10 channel V.H.F. and radio compass, 8 passenger seats.

RAPIDE Mk. 4, Queen II engines with constant speed propellers, 6 passenger seats, 18-gallon long-range tanks, nil hours throughout, all new fabric, MR 80 V.H.F. and radio compass.

STANDARD 8-seat Rapide, Queen III engines, nil hours throughout, all new fabric, MR 80 V.H.F. and radio compass, X9 or X5 fixed pitch propellers to order, 9-gallon long-range tanks fitted.

FOR further details of the above, contact Hants and Sussex Aviation, or phone Portsmouth 63051. 483-8822

Aircraft Wanted

AUSTER AUTOCRAT wanted. Full details to Vendair, Croydon Airport. Croydon 5777. 483-2

AIRCRAFT ACCESSORIES, SPARES AND COMPONENTS

COMPONENTS, spares and instruments for all aircraft and engines. A.R.B. released. Airtrade, Ltd., Croydon Airport. Phone, Croydon 0643. zzz-691

ROLLASONS are specialists in the overhaul of all Gipsy engines. Croydon 5151. zzz-659

PHILLIPS AND WHITE, LTD.

OFFER from stock a comprehensive range of new spares and components for the following engines: CHEETAH IX, X and XV, de Havilland Gipsy, Major and Queen series.

INSTRUMENTS and instrument parts, navigational equipment, electrical components and aircraft spares are also available from stock.

61 QUEENS GARDENS, London, W.2. Phone, Ambassador 8651, 2764. Cables, "Gyrair, London." zzz-670

THE REGIONAL AIR TRADING CO., Croydon Airport, for Rapide spares of every description. Phone, Croydon 8521. zzz-663

ROLLASONS for Tiger Moth and Gipsy engine spares. Croydon 5151. zzz-658

AIRFRAME spares for Dakotas, Harvards, Piper Cub, Fairchilds, Argus, Beechcraft, D-17S, Mosquito, Spitfire, Firefly. Engine spares for Pratt & Whitney, Armstrong Siddeley, Lycoming, e.c., accessories and instruments for all types of aircraft. A. J. WALTER, LTD., The Drive, Horley, Surrey. Phone, Horley 1420 and 4294. Cables, "Cubeng, London." 483-12

REPAIRCRAFT SERVICES, The Common, Cranleigh, Surrey. Cranleigh 536. Instruments and Autopilot overhaul test sales. Dakota and most other instruments from stock. zzz-701

HELICOPTERS

HELICOPTER SERVICES, LTD., offer their aircraft for all charter services. 96 Piccadilly, London, W.1. Gro 5495-6. zzz-692

HELICOPTER charter, U.K. and overseas. Autair, Ltd., 75 Wigmore St., London, W.1. Welbeck 1131 483-688

APPOINTMENTS BUREAUX

PLANAVIA International Aeronautical Appointments Bureau, 338 Kilburn High Rd., N.W.6. Mal 3142. 483-16

CLOTHING

R.A.F. Officers' uniforms for sale, new and reconditioned. Fisher's, 86-88 Wellington St., Woolwich. Phone 1055. zzz-672

CONSULTANTS

R. W. SUTTON (CONSULTANTS), LTD., 7 Landsdown Place, Cheltenham. Phone 5811. 495-8824

ENGINES AND ENGINE SPARES

GIPSY MAJOR Mk. 10 and Mk. 1 engines, part-exchange offered with your time-expired engine; propellers for most types of light aircraft. Mitchell Aircraft, Ltd., The Airport, Portsmouth. Phone 717641. zzz-689

HIRE AND CHARTER

RAPIDES for hire or charter. A. J. Whittemore (Aeradio), Ltd., Croydon Airport, Surrey. zzz-683

BRISTOL 170 Wayfarer for Barthull Charter, passenger or freight, fitted 48 seats. Long term preferred. Apply Shortcut Aviation, Ltd., Godstone Rd., Whyteleafe, Surrey. Phone 8211. 483-13

NOTICES

AIR TRANSPORT ADVISORY COUNCIL

THE AIR TRANSPORT ADVISORY COUNCIL give notice that they have received the undermentioned applications to operate scheduled air services:—

FROM EAST ANGLIAN FLYING SERVICES LTD., OF SOUTHEND AIRPORT, ESSEX:—

APPLICATION NO. 2454 for a Normal Scheduled Service initially with Viking aircraft and later also with Ambassador aircraft for the carriage of passengers, supplementary freight and mail between Southend and Basle at a frequency of four return flights weekly for 10 years from October 1, 1959.

FROM CAMBRIAN AIRWAYS LTD., OF CARDIFF (RHOOSE) AIRPORT, NR. BARRY, GLAM:—

APPLICATION NO. 27/3 for permission to substitute Bournemouth (Hurn) for Southampton (Eastleigh) on the Normal Scheduled Service which they are at present authorized to operate with Dove, Dakota and Heron aircraft on the route Cardiff and/or Bristol-Southampton (Eastleigh) and or Paris at a frequency of 2-3 return flights weekly increasing in accordance with traffic demand until March 31, 1963.

APPLICATION NO. 673/1 for permission to substitute Bournemouth (Hurn) for Southampton (Eastleigh) on the seasonal Normal Scheduled Service which they are at present authorized to operate with Dakota, Dove and Heron aircraft between Southampton (Eastleigh) and Dinard, at a frequency of two return flights weekly from May to September each year until September 30, 1962.

FROM EAGLE AIRWAYS, LTD., OF 40 EDGWARE ROAD, LONDON, W.2:—

APPLICATION NO. 729/2 for permission to operate DC6C aircraft in addition to Viking, Dakota and Viscount aircraft on the seasonal Normal Scheduled Service which they are at present authorized to operate between London Airport or London (Blackbushe) and La Baule at a frequency of three return flights weekly from April to October each year until October 31, 1962.

FROM SILVER CITY AIRWAYS LTD., OF 62 BROMPTON ROAD, LONDON, S.W.3:—

APPLICATION NO. 2219/1 for an amendment to the terms of approval of the seasonal Normal Scheduled Service which they are authorized to operate with Bristol 170, Dakota and Heron aircraft between Blackpool and Dublin at a frequency of three return flights weekly from May to September each year until September 30, 1965, so as to permit them to operate at an increased frequency of four return flights weekly from May to October each year until October 30, 1965.

FROM MORTON AIRSERVICES LTD., OF CROYDON AIRPORT, CROYDON, SURREY:—

APPLICATION NO. 2375/1 for an optional traffic stop at Swansea on the U.K. Internal Service which they are at present authorized to operate with Heron and Dove aircraft between London (Croydon or Gatwick) and Brawdy, at a frequency of one return flight daily until February 3, 1966.

These applications will be considered by the Council under the Terms of Reference issued to them by the Minister of Civil Aviation on July 30, 1952. Any representations or objections with regard to these applications must be made in writing stating the reasons and must reach the Council within 14 days of the date of this advertisement, addressed to the Secretary, Air Transport Advisory Council, 3 Dean's Yard, London, S.W.1, from whom further details of the applications may be obtained. When an objection is made to an application by another air transport company on the grounds that they are applying to operate the route or part of route in question, their application, if not already submitted to the Council, should reach them within the period allowed for the making of representations or objections. 483-1

PACKING AND SHIPPING

R. AND J. PARK, LTD., 143-9 Fenchurch St., E.C.3. Phone: Mansion House 3089. Official packers and shippers to the aircraft industry. zzz-674

PHOTOGRAPHY

NEW American and British cameras, all types, also spares. G.S.A.P. gun cameras. E.W.S. Co., 69 Church Rd., Moseley, Birmingham. 487-8806

RADIO AND RADAR

SPERRY Zero reader, Type ZL1, course selectors, control panels, flight computers and indicators, three complete installations in stock. A. J. Whittemore (Aeradio), Ltd., Croydon Airport, Surrey. zzz-684

STR12D, STR9Z, STR9X and most other British and American V.H.F. R/T equipment always in stock. A.R.B.-approved design installations into any type of aircraft. A. J. Whittemore (Aeradio), Ltd., Croydon Airport, Surrey. zzz-685

SITUATIONS VACANT

A.F.R.Ae.S., A.R.B.Certs., A.M.I.Mech.E., etc., on "No pass, no fee" terms. Over 95% successes. For details of exams. and courses in all branches of aeronautical work, aero engines, mechanical engineering, etc., write for 148-page handbook—free. B.I.E.T. (Dept. 703), 29 Wright's Lane, London, W.8. zzz-690

WANTED, A- and C-licensed aircraft engineer covering Anson airframe and Cheetah engines. Willing to travel abroad. Apply: Derby Aviation, Ltd., Derby Airport, Derby. 483-8815

TECHNICAL illustrators required for the Technical Publications Department of Vickers-Armstrongs (Aircraft), Ltd., South Marston Works, P.O. Box 8, Swindon, Wilts. Those who have studied for the Intermediate and Final examination of the London City and Guilds would be very suitable for these vacancies. Apply to Personnel Dept., as above. 484-8820

B. S. T. AERONAUTICAL CO., LTD.
ARB APPROVED
C47 - DC3 Specialists

1. Starters, Generators, Tacho-Generators
2. Hydraulic, Vacuum, Fuel Pumps
3. Undercarriage Bolts and Bushes
4. Flight and Engine Instruments
5. A.N. Materials
6. Wheel and Brake Spares
7. Anti-drag Rings and Spares

BLACKBUSHE AIRPORT, CAMBERLEY SURREY
TELEPHONE CAMBERLEY 1600 EXT 31 & 310

Southend Municipal Flying School
Commercial and Private Pilot's Licence.
Instructors Rating. Night Flying every night.
No entrance fee or subscription.
Austers £4 5s., Chipmunks £5 5s., dual or solo.
Contract rate £3 15s.
Municipal Airport, Southend-on-Sea, Essex
Phone: Rochford 56204

AIRCRAFT GENERATION
Owing to considerable expansion of their activities in the aircraft generation field a large London Company has vacancies for

SENIOR DEVELOPMENT ENGINEERS

interested in aircraft electrical generation ranging from 4 K.V.A. to 400 K.V.A. A knowledge of alternators or transistorised electronic control equipment an advantage.

Candidates should possess B.Sc. or similar qualification in electrical engineering.

In these positions there is every opportunity for real ability to be recognised, resulting in advancement in this expanding organisation. Good conditions of employment and the Company operates a substantial Superannuation and Life Insurance Scheme.

Salary range £1,050 to £1,500 per annum, according to qualifications and experience. Replies, which will be treated in utmost confidence, should be addressed for the attention of the Staff Manager, Box A 831, c/o "The Aeroplane."

CENTRAL AFRICAN AIRWAYS CORPORATION

APPLICATIONS are invited for the position of Contract Navigation Officer. Minimum requirements are:—

(1) Flight Navigator's Licence. (2) 200 hours Astro experience.

FLYING DUTIES: Navigation of once-weekly Zambez. service from Khartoum to Benina and return after night stop at Benghazi. Also similar duties on occasional charter flights over the same route. Approximately 50 hours flying per month.

SALARY and conditions of employment: £112 10s. per month. Free single accommodation with board provided at Khartoum and Benghazi. No subsistence or other allowances payable.

PERIOD of Contract: Immediate until approximately March 31 1960. One month's salary (additional) payable upon satisfactory completion of contract.

APPLICATIONS to be forwarded by air mail to the Personnel Manager, Central African Airways Corporation, P.O. Salisbury Airport, Southern Rhodesia. Closing date for receipt of applications, April 23, 1959. 483-15

FAIREY AVIATION LTD

are providing a training Mission to Indonesia in connection with the supply of Gannet aircraft to the Indonesian Navy. The Mission will be based at Surabaya for approximately 18 months to 2 years following a short period in U.K. Salary and allowances will be in keeping with the short term of contract and conditions of living. Preference will be given to Naval personnel recently released from the Service with Gannet experience. The following appointment is to be made immediately.

QUALIFIED FLYING INSTRUCTOR

The following personnel will be required later this year:—

Specialists in the following Trades:—

(a) AIRFRAMES
(b) ENGINES
(c) ELECTRICS
(d) RADIO/RADAR
(e) ORDNANCE

Full details of experience, availability, etc., should be sent to **Service & Liaison Dept., Fairey Aviation Limited, Hayes, Middlesex.**

AIRCRAFT SPRING WASHERS

To B.S. SPECIFICATION 2 SP.47.
CROSS MFG. CO. (1938) LTD.
COMBE DOWN, BATH.

HUNTING AIRCRAFT LIMITED
require
SENIOR DESIGN DRAUGHTSMEN

for structures, mechanical design and engine installations. H.N.C. or equivalent qualifications desirable, plus several years experience in the aircraft industry.

There is an extensive programme on all aspects of design work.
Vacancies are at LUTON only.
Holiday arrangements honoured for the current year.
Contributory Pension and Life Assurance Scheme.

Applications, giving full details of qualifications, experience, age and salary desired, and quoting ref. H.A.L./76/7, should be addressed to:—

The Personnel Manager,
HUNTING AIRCRAFT LIMITED,
The Airport, LUTON, Beds.

CHARTER pilot, experienced London zone and airways required for well-equipped Rapides at present Croydon based. Box A821, care of THE AEROPLANE. 483-8816

SENIOR AERONAUTICAL DRAUGHTSMAN, TEAL, NEW ZEALAND.

We require a Senior Aeronautical Draughtsman in our Design and Draughting office at Auckland, New Zealand. The qualifications expected would be the ability to undertake Aircraft Stressing and Design to approved company standards and to direct the activities and production of the Drawing Office. Previous practical aeronautical engineering experience especially with reference to airframes and engines (and an aeronautical or engineering degree or equivalent) are necessary qualifications.

The salary will be in accordance with the qualifications and experience of the successful applicant and consistent with the responsibility involved. The airline provides for its employees outstanding staff superannuation benefits and generous travel concessions (including inter-line).

Replies, which will be treated in strict confidence, should be by first-class airmail letter addressed to:

Personnel Officer,
Tasman Empire Airways, Ltd.,
P.O. Box 2201,
AUCKLAND, N.Z.

483-10

VIKING A- and/or C-licensed aircraft engineers who have good all-round experience, wanted by Tradair, Ltd., Southend Airport, Essex. 484-8819

PRODUCTION ENGINEER.

HINDUSTAN AIRCRAFT (PRIVATE), LTD., BANGALORE (SOUTH INDIA).

APPLICATIONS invited from qualified and experienced technicians of Indian nationality for post of Production Engineer (Aircraft) with the above organization. Candidate should possess recognized degree in engineering and have 10 years' experience in aircraft/automobile/light engineering industry engaged on manufacture and assembly of interchangeable products. Should have thorough knowledge of process planning, estimating, jig and tool design, programme planning, shop loading, materials, manufacturing methods, machine tools, workshop equipment and be able to prepare project reports. Membership of Professional Institution or experience in aircraft manufacture an advantage. Age between 30-45 years. Pay scale Rs.1200-50-1600 per mensum.

FURTHER details and application forms on request quoting 6 15C from the High Commission of India, Establishment Department, India House, London, W.C.2, who will receive applications up to April 30, 1959. 483-6

A-LICENCE radio engineer required; good salary. Apply Chief Engineer, Morton Engineering Services, Ltd., Croydon Airport, Surrey. 483-11

THE COLLEGE OF AERONAUTICS.

APPLICATIONS are invited for the following appointments in the Department of Aircraft Design.

LECTURER in aero-elasticity. Candidates should have had several years' practical experience in industry or research.

LECTURER in aircraft systems engineering. Candidates must be familiar with servo-mechanism theory. Several years' practical experience, in connection with aircraft or missiles, of one of the following is essential: hydraulic or pneumatic actuation; fuel systems; air conditioning or de-icing.

CANDIDATES for both appointments should be of graduate status in science or engineering. Salary in scale £900 x £50 to £1,350 x £75 to £1,650 p.a., depending on qualifications and experience, with F.S.S.U. and family allowance. Applications, giving full particulars and quoting the names of three referees, to The Recorder, The College of Aeronautics, Cranfield, Bletchley, Bucks. Further particulars available. 483-4

REQUIRED by aircraft company in south of England, Detail Engine Inspector, either licensed or inspection approved. Write Box A832, care of THE AEROPLANE. 483-8823

STRESS ENGINEERS

REQUIRED FOR DUTIES

AT LUTON

ON VARIED PROGRAMME OF WORK, INCLUDING THE AIRCRAFT MANUFACTURING COMPANY'S D.H. 121 JET AIRLINER.

Degree, H.N.C. or equivalent qualifications desirable. Contributory Pension and Life Assurance Scheme.

APPLICATIONS, GIVING FULL DETAILS OF QUALIFICATIONS, EXPERIENCE, AGE AND SALARY DESIRED, SHOULD BE ADDRESSED TO:—

THE PERSONNEL MANAGER
(REF. HAL/69/7),
HUNTING AIRCRAFT, LTD.,
THE AIRPORT,
LUTON, BEDS. 483-09

APPLICATIONS invited for positions. Captains and First Officers with D.C.4 and Viking experience; cabin staff, receptionists and secretary. Applications giving full qualifications by post only to Base Manager, I.A.T. Blackbushe Airport, Camberley, Surrey. 483-19

HERTFORDSHIRE COUNTY COUNCIL.

THE ST. ALBANS COLLEGE OF FURTHER EDUCATION AND HERTFORDSHIRE COLLEGE OF BUILDING.

Principal: D. T. Newman, B.Sc., J.P.

Applications are invited for a post as Grade "B" Assistant for Teaching mainly connected with a new Aircraft Production—Airframes course.

The successful candidate will be required to take over the organization of this course and work in close co-operation with local aircraft manufacturers.

Appointment will take effect from September, 1959.

Application forms may be obtained from the Principal to whom they should be returned at The College of Further Education, 29 Hatfield Road, St. Albans. 483-18

RADIO-LICENSED "A" Engineer, preferably with rating covering DC6A aircraft radio. Please apply in confidence to: Personnel Officer, Eagle Aircraft Services, Ltd., Blackbushe Airport, Camberley, Surrey. Phone, Yately 2371. 483-9

SITUATIONS WANTED

AIR Pilot, 39, 20 years' flying experience, wishes ground work, free September. Box A833, care of THE AEROPLANE. 483-7

TUITION

ENGLAND'S only fully equipped flying school run by private enterprise offers generous deferred-payment facilities for P.P.L. training, twin-engine conversions instructors course, etc. Derby Aviation, Ltd., Elstree Aerodrome, Herts. Phone, Elstree 3070. 483-8813

EXETER AIRPORT, LTD. Courses for Commercial Pilot's Licence, from £625; Private Pilot's Licence, from £101 5s. Contract rate solo flying, Austers and Tigers, £2 7s. 6d. per hr.; normal dual/solo rates, £3 7s. 6d. per hr.; twin conversions, £6 12s. per hr.; Chipmunk, £3 5s. per hr.; Messenger, £4 18s. 6d. per hr. Limited accommodation, £5 15s. 6d. per week. Exeter Airport, Exeter. Phone 67433. zzz-680

AIRWAYS AERO ASSOCIATIONS, LTD., Croydon Airport. M.T.C.A.-approved P.P.L., C.P.L., I/R Courses. Fully equipped Chipmunk, Auster, Proctor and twin-engined aircraft. Link £1 per hour. Specialist instruction. Competitive and contract rates. Phone, Croydon 9308. zzz-699

THE next ab-initio course for the Commercial Pilot's Licence and Instrument Rating to be held at England's only fully equipped flying school run by private enterprise, begins on April 21. A few vacancies only. Derby Aviation, Ltd., Elstree Aerodrome, Herts. Phone, Elstree 3070. 483-8814

LONDON SCHOOL OF AIR NAVIGATION.

MINISTRY Approved for Commercial and Instrument Rating. Subjects for all professional licences and ratings embracing academic, technical, simulated and flying; home-study excellent alternative; individual coaching; refresher courses; officially appointed by H.M. Services for Correspondence Scheme. Refer Education Officer or direct 33 Ovington Square, Knightsbridge, London, S.W.3. Kensington 8221. zzz-697

CIVIL pilot-navigator licences.

AVIGATION, LTD., provides full-time or postal tuition or a combination of either of these methods to suit individual requirements for the above licences. Classroom instruction can be provided for A.R.B. General, certain specific types and performance schedule examinations. Link Training Dept., at Monarch 1364.

FOR full details apply to the Principal.

AVIGATION, LTD.,
30 CENTRAL CHAMBERS,
EALING BROADWAY,
LONDON, W.5.
Phone, Ealing 8949. zzz-669

CAMBRIDGE Aero Club. M.T.C.A.-approved Private Pilot's Licence course, 30 hours £3 10s. per hour. D.4 Link trainer for radio compass and I.L.S. procedures to Instrument Rating Standard. £1 per hour, dual and solo. No fees or subscriptions. Night flying, £4 10s. per hour. Auster J.1.N., £3 15s. per hour, dual and solo. No fees or subscriptions. Club operates on all days, including week-ends. The Aerodrome, Newmarket Rd., Cambridge. Phone 56291. 484-8811

LEARN to fly; £32; instructor's licences and instrument flying for £3 15s. per hour; night flying, £4 15s. per hour. Residence 6 gns. weekly. Approved M.T.C.A. Private Pilot's Licence Course. Specialized course for Commercial Pilot's Licence. Wiltshire School of Flying, Ltd., Thruxton Aerodrome (Andover Junction, 1 hr. 15 min. from Waterloo), Hants. zzz-700

AIRWORK SCHOOL OF AVIATION, PERTH.

M.T.C.A.-APPROVED courses for private and commercial licences and instrument rating; residential and recreational facilities. Prospectus from Airwork Services, Ltd., 35 Piccadilly, London, W.1, or Perth Aerodrome, Scotland. 483-5

MORLEY AVIATION, LTD. (Herts and Essex Aero Club, 1958). Aerodrome, Stapleford. M.C.A.-approved private pilot's licence course. Auster, Gemini and Tiger aircraft; trial lesson 35s.; 15 miles centre of London. Central Line Underground to Theydon Bois, bus 250 to club; open every day. Phone, Stapleford 257. 483-695

YOUR commercial pilot's course for £625. Apply to The Manager, Plymouth Aero Club, Plymouth Airport. Phone 72752. 483-676

CLUB NOTICES, ETC.

SURREY FLYING CLUB. Surrey and Kent Flying Club, Biggin Hill. Tiger, Hornet and Leopard Moths, Chipmunk and Prentice. Green Line 705 direct in one hour from London. Biggin Hill 2255. 483-694

BOOKS AND PUBLICATIONS

WORLD'S largest stock of old aviation books (over 15,000). Catalogue free. Top price paid for Janes, any year, World War I and other aviation books. Stuart, Fairlight Hall, Hastings. zzz-681

"FLIGHT," first volume, original binding, £20. Private owner. Box A834, care of THE AEROPLANE. 483-3

"THE AEROPLANE" DIARY, 1959. Compiled by the staff of THE AEROPLANE. Contains brief specifications of British civil, military and research aircraft (48 of which are illustrated), lists of British aircraft and aero-engine constructors, organizations, flying records, Royal Air Force Commands, and a vocabulary of aeronautical terms in six languages. Illustrated, 75 pages plus diary. 4s. 3d. net (Rexine) (including purchase tax) from booksellers, or by post 4s. 9d. from the publishers, Temple Press Limited, Bowling Green Lane, London, E.C.1. zzz

Books and Publications Wanted

£8 Each offered for Jane's Airships/Aircraft prior 1924. Storey, 3 Cecil Court, London, W.C.2. 483-8810

INDEX TO ADVERTISERS

Name	Page
A	
Adcola Products, Ltd.	8
Aero-Enterprises (Boreham Wood), Ltd.	2
Air Trainers Link, Ltd.	7
Attewell, B., & Sons, Ltd.	8
Avica Equipment, Ltd.	Inside Back Cover
B	
Blackburn & General Aircraft, Ltd.	22
Boeing Airplane Co., Ltd.	16, 17
Box No. A831	23
B.P. Aviation Services	20
Bristol-Siddeley Engines, Ltd.	Back Cover
British Airline Pilots Association, The	8
British Aviation Insurance Co., Ltd., The	6
B.S.T. Aeronautical Co., Ltd.	23
C	
Canadair	12 & 13
Cross Manufacturing Co. (1938), Ltd.	8, 23
D	
Delaney Gallay, Ltd.	15
Derby Aviation, Ltd.	22
E	
English Electric Co., Ltd., The (Guided Weapons Division)	19
F	
Fairey Aviation, Ltd.	23
Fairey Company Limited, The	Front Cover
G	
Gloster Technical Developments	9
H	
Handley Page, Ltd.	10
Hunting Aircraft, Ltd.	21, 23
I	
Irish Air Charter, Ltd.	22
L	
Latex Upholstery, Ltd.	6
M	
Meerbergen, Alfred	8
N	
Northrop International	5
O	
Overseas Aviation (C.I.), Ltd.	8
P	
Palmer Aero Products, Ltd.	1
Peto & Radford, Ltd.	14
Plessey Co., Ltd., The	Inside Front Cover
Pullin, R. B., & Co., Ltd.	6
R	
Rye, Claude, Ltd.	8
S	
Shell Aviation Services	18
Southend Municipal Flying School	23
Swansea Corporation	22
T	
Thorn Electrical Industries, Ltd.	3
V	
Vickers-Armstrongs (Aircraft), Ltd.	11
W	
Wynn, E. D. (Aircraft), Ltd.	8

Printed in England and Published Weekly by the Proprietors, TEMPLE PRESS LIMITED, BOWLING GREEN LANE, LONDON, E.C.1.
Registered at the G.P.O. as a Newspaper. Entered as second-class matter at the Post Office at New York, N.Y., under the Act of March 3, 1879 (Sect. 522 P. L. & R.).

AGENTS ABROAD—EUROPE—Messageries Dawson (S.A.), Paris; Messageries Hachette, et Cie, Paris; W. H. Smith & Son, Paris and Brussels. CANADA—Wm. Dawson Subscription Service Ltd., Toronto; Gordon & Gotch Ltd., Toronto. U.S.A.—Eastern News Co., 306 West 11th Street, New York, 14, N.Y. AFRICA—Central News Agency, Ltd., Cape Town; W. Dawson & Son (S.A.), Cape Town. ASIA—W. Thacker & Co., Ltd., P.O. 190 Bombay. AUSTRALIA and NEW ZEALAND—Gordon & Gotch (A'sia), Ltd.

AVICA-FLEX STAINLESS STEEL BELLOWS ASSEMBLIES

(For temperatures up to 450°C)
and also precision barometric units with closely controlled spring rate tolerances

AVICA-FLEX STAINLESS STEEL FLEXIBLE PIPE ASSEMBLIES

including the Type W welded fully-fireproof lightweight coupling
For all applications involving temperatures from —183°C to as high as +450°C.
Sizes from $\frac{1}{8}$" to 4"

RIGID TUBE COUPLINGS

Mechanically attached with V or bolted flange. No welding. No brazing. Leak proof. Pressure tight. Will withstand extremes of temperature and vibration.

Proved and Approved

over 20 years

by the best known names in the industry

Continuous development to keep pace with ever-growing pressures, temperatures and vibration stresses, ensures that the AVICA range of flexible assemblies meets every specification requirement of the aircraft and missile designer.

Swivel pipe couplings

Ignition harness

Support clamps

Synthetic rubber flexible pipe assemblies

FLEXFLYTE

Flexflyte lightweight ducting

AVICA

Avica Equipment Limited

MARK ROAD, HEMEL HEMPSTEAD, HERTS

Telephone: Boxmoor 4711 Cables: Avica, Hemel Hempstead

Vol. 96. No. 2483

NATO choice highlights ORPHEUS success

THE AEROPLANE
APRIL 3, 1959

ORPHEUS-POWERED FIAT G 91 CHOSEN FOR LARGE SCALE PRODUCTION

As a result of the 1957 Brétigny trials, the Fiat G 91, powered by the 5,000-lb thrust Orpheus 803 turbojet, was unanimously recommended for immediate production as the standard NATO lightweight tactical fighter for the operational squadrons deployed in defence of Europe.

Another Orpheus-powered aircraft, a developed version of the Breguet 1001 Taon which took part in the trials, was recommended as the second generation lightweight tactical fighter. Of the ten design proposals originally submitted to NATO for this role, nine were powered by the Orpheus, which was developed with the support of the US Mutual Weapons Development Team for this purpose.

The Fiat G 91 squadron already in service, is being evaluated by NATO. Orders for large numbers of the aircraft have been placed by Italy, implementing the NATO decision, while Germany, France, Greece and Turkey are expected to follow suit shortly.

Besides large-scale production at Bristol, the Orpheus turbojet is licensed for building in Italy and France for the NATO defence programme, and in addition is being produced in India for the Folland Gnat.

Continued development, many roles

More advanced Orpheus versions are well under way. These are not only being developed to higher powers for advanced strike aircraft and fighters, but are also being specifically developed for trainers and medium-size civil aircraft. The immense future potential of the Orpheus becomes ever more apparent.

Bristol Siddeley

ENGINES LIMITED